DIDACTIC REGULATIONS OF THE DEGREE PROGRAM

NATURAL SCIENCES

CLASS LM-60

School: Polytechnic and Basic Sciences

Department: Biology

Regulations in force since the academic year 2024-2025

ACRONYMS

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

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Art. 1
Object

1. This Didactic Regulations govern the organisational aspects of the Master's degree course in "Natural Sciences" (class LM-60 – Natural Sciences). The degree course in in Sciences for the Natural Sciences is hinged in University of Naples Federico II, Department of Biology, and is a course taught in Italian.

2. The Master's degree course is governed by the Didactic Coordination Commission (CCD), pursuant to Art. 4 of the RDA.

3. The Didactic Regulations is issued in compliance with the relevant legislation in force, the Statute of the University of Naples Federico II, and the RDA.

Art. 2
Training objectives

The Master's Course in Natural Sciences is mainly characterized by its declared interdisciplinarity. In fact, it constitutes one of the natural outlets for graduates of class L 32 Sciences and Technologies for the Environment and Nature which is equally interdisciplinary in its articulation.
The master's graduate must have a significant approach to the study of biocenoses, contextualizing them with abiotic and anthropic factors and to the study of environmental problems. You must be able to make targeted use of systematic tools for the purpose of an informed study of biodiversity. For this purpose, mastery of scientific methods will be necessary, as well as appropriate lexical familiarity, including in at least one foreign language.
The CdL is characterized by a high level of interdisciplinary knowledge of nature. The identification of the scientific disciplinary sectors in their vastness is also affected by the verified possibility of employment of the graduate in Natural Sciences in a series of highly qualified professions, which characterize their profile as a whole. In this sense, alongside the traditional 'naturalistic' disciplines and the indispensable in-depth analysis of the 'Chemical, physical, mathematical and IT disciplines', a series of scientific disciplinary sectors has been included in the 'Agricultural, management and communication disciplines', 'Earth Sciences' and 'Humanistic, economic and social disciplines' which will allow the Master's graduate to acquire useful knowledge and skills to better establish themselves in the world of work, including the field of research.
The professional and cultural figure identified in the training objectives of the Master's Degree in Natural Sciences is essentially the traditional one of the naturalist who must have a:
In-depth knowledge and understanding of the disciplines characterizing the class, in particular, those relating to
study of the biotic and abiotic components of ecosystems, their conservation, communication techniques of naturalistic and environmental themes, understanding of anthropic and natural phenomena that influence the quality of the environment;.
In-depth scientific knowledge of the most important processes that influence the quality of the environment and the conservation of biodiversity.
Understanding of the interdisciplinary aspects of environmental and nature studies and development of the corresponding skills to frame the problems of naturalistic research in the historical evolutionary context.
The educational path will be integrated with laboratory activities, internships and internships, including at public institutions and private facilities, and with field experimentation, through multi- and inter-disciplinary excursions, among the training activities in the various SSDs.

The completion of a final exam will take place with the production of a paper reporting the results of original scientific research. The course will be able to divide the course into functional curricula for specific training needs.
The time reserved for personal study or other individual training activities is greater than 60% of the total hourly commitment for frontal teaching activities and 50% for training activities with a high experimental and practical content. Ranges of training credits have been used within the areas since the possibility of activating more than one curriculum is envisaged.

Art. 3
Professional profile and work opportunities

The Master's degree course aims to train the professional figure of the Expert Naturalist

Function in a work context
The interdisciplinary character of the class is expressed in the verified possibility of employment of the Naturalist in a series of highly qualified professions, which characterize the figure. Among the functions performed are:
both basic and applied naturalistic research activities; teaching activities in schools of all levels in which the teaching of scientific disciplines is envisaged for master's graduates in possession of the credits required by current legislation who will be able to participate in the entrance tests for the training courses of teaching staff; census of the natural heritage and design of monitoring plans; impact assessment, recovery and management of the natural environment; naturalistic management and conservation of biodiversity, the application of those aspects of environmental legislation that require naturalistic skills;
- drafting of park plans and their implementation tools (management plan, sector plans, detailed plans, use regulations, etc.);
- drafting management plans for reserves (National, Regional, Local) and local oases however established;
- drafting of thematic maps (biological and abiological);
- organization and management of museum institutions in the naturalistic area; creation of educational materials, including multimedia, for educational institutions and museums;
- planning and management of nature itineraries; dissemination of environmental issues and naturalistic knowledge.

Skills associated with the function
The naturalist will carry out the functions listed above using the high skills obtained during the study course, in particular:
- in the systemic analysis of the natural environment, in all its biotic and abiotic components and in their interactions, also considered in their historical-evolutionary dimension;
- in the use of the scientific method of investigation and the knowledge necessary for starting scientific research in the naturalistic field;
- in the management and conservation of quality in the natural environment;
- in the communication and management of naturalistic and environmental information;
- in wildlife management and biodiversity conservation;
- in fluent use, in written and oral form, at least one European Union language other than Italian, also with reference to disciplinary lexicons;
in the ability to work in a team, with great autonomy, also taking on responsibilities for projects and structures.

Employment opportunities

The main employment opportunities foreseen for the Naturalist are in public and private bodies involved in the management of the natural environment or naturalistic museum areas, as well as in the teaching of natural sciences: scientific museums, aquariums, botanical gardens, naturalistic parks with a geological or biological vocation , national or regional parks; universities, public and private nature consultancy entities (for example, regional and national agencies for environmental protection). Master's graduates in possession of the credits required by current legislation will be able to participate in the entrance tests for the training courses of teaching staff for first and second level secondary schools.

Art. 4
Admission requirements and knowledge required for access to the Degree Program[1]

Graduates of class L-32 (or of the equivalent class 27 - Sciences and Technologies for the Environment and Nature of Ministerial Decree 509/99) in possession of the following minimum skills can access the Master's degree course in Natural Sciences:
1. Organization of living eukaryotes with particular attention to animals and plants, including the mechanisms of reproduction and development and general knowledge of their classification and evolution, systematics and biodiversity, for at least 24 credits, proportionally divided between the zoological and botanical cultural area;
2. knowledge of biocenoses, ecology and ecosystem dynamics and/or physical geography, for at least 9 credits;
3. Earth Sciences with particular reference to Geomorphology, Mineralogy/petrology, geology and paleontology for at least 18 credits;
Furthermore, students in possession of a 1st level degree or equivalent qualification obtained in Italy or abroad and recognized as suitable may be admitted to the Master's Degree Course in Natural Sciences. For these, knowledge of the basic principles of Mathematical, Chemical, Physical and Natural Sciences is required and as better specified in the regulation, and in particular those of:
1) Mathematics including the foundations of the Institutes of Mathematics, analytical geometry, elementary functions and logarithms;
2) Classical physics, with reference to the foundations of mechanics, optics and electromagnetism;
3) General and inorganic chemistry, with reference to the foundations of the structure and properties of matter and its states of aggregation, and to the periodic properties of the elements; basic knowledge of organic chemistry and biochemistry.
4) Cellular organization, structure and morphology of living things with particular attention to animal and plant biology, reproductive mechanisms and development in plants and animals; of the general principles of the classification and evolution of organisms, of the systematics and taxonomy of all plants and the animal world;
5) global importance of biocenoses and plant and animal biodiversity, ecology and ecosystem dynamics of both natural and anthropized environments;
6) Earth Sciences with reference to Geography, Geomorphology, Climatology, Mineralogical and Geological disciplines; knowledge of the evolution of the Earth as a systemic whole, of the dynamics of the Lithosphere, of systematic mineralogy, of the geological cycle of rocks, of volcanology, of the principles of stratigraphy and sedimentology.
7) Evolutionary history of the Earth through the recognition of Fossils and the interpretation of the Paleoenvironment including the evolutionary history of Man;
8) basic knowledge and use of the main widely used computer and application programs;
9) basic English language and scientific terminology relating to the principles of translation and understanding of written texts, for at least 4 credits. The assessment of individual preparation will

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

be carried out, according to the methods specified in the Teaching Regulations of the course of study, for all students in possession of the curricular requirements.
The following skills are also required:
- interpret the meaning of a text and summarize or rework it in written and oral form;
- solve a problem through the correct identification of data and their use in the most effective form;
- use elementary logical structures (for example, the meaning of implication, equivalence, negation of a sentence, etc.) in written and oral speech,
- to critically evaluate a piece of data or an observation and use them appropriately in their context (e.g. knowing how to grasp an obvious inconsistency in a scientific measurement),
- to characterize the physical environment, to recognize the taxa that make up a biological community, define its structure and the functional roles of the components and evaluate ecosystem processes.

Art. 5
Procedures for access to the Degree Program

1. The CCD of the Degree Program normally regulates the admission criteria and any scheduling of enrolments, except in the case subject to different provisions of law[2].
2. Verification of personal preparation is always mandatory, and only students who meet the curricular requirements can access it.
3. The verification of individual preparation for those enrolled not from the natural path (Degree in Nature and Environmental Sciences) will be carried out through interviews in the disciplines mentioned above and not included in their previous training path.

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

Graduates of the L-32 class who possess the following minimum skills can access the master's degree course:
1. knowledge of the organization of living eukaryotes, with particular regard to animals and plants, including the mechanisms of reproduction and development and general knowledge of their classification, systematics and biodiversity, for at least 24 credits, proportionally divided between the zoological and botanical cultural area ;
2. knowledge of biocenoses, ecology and ecosystem dynamics and/or physical geography, for at least 9 credits;
3. knowledge of Earth Sciences, with reference to Geomorphology, Mineralogy/petrology, Geologies and Paleontology, for at least 18 credits.
Furthermore, students in possession of a 1st level degree or equivalent qualification obtained in Italy or abroad and recognized as suitable may be admitted to the Master's Degree Course in Natural Sciences. For these, knowledge of the basic principles of Mathematical, Chemical, Physical and Natural Sciences is required, as better specified in the regulation, and in particular that of:
1) Mathematics, including the foundations of the Institutes of Mathematics, analytical geometry, elementary functions and logarithms;
2) Classical physics, with reference to the foundations of mechanics, optics and electromagnetism;
3) General and inorganic chemistry, with reference to the foundations of the structure and properties of matter and its states of aggregation, and the periodic properties of the elements, basic knowledge of organic chemistry and biochemistry. 4) Cellular organization, structure, and morphology of living things with particular attention to animal and plant biology, reproductive mechanisms and development in plants and animals; of the general principles of the classification and evolution of organisms, of the systematics and taxonomy of all plants and the animal world.
5) Global importance of biocoenoses and plant and animal biodiversity, ecology, and ecosystem dynamics of both natural and anthropized environments.
6) Earth Sciences with reference to Geography, Geomorphology, Mineralogical and Geological disciplines; knowledge of the evolution of the Earth as a systemic whole, of the dynamics of the Lithosphere, of systematic mineralogy, of the geological cycle of rocks, of volcanology, of the principles of stratigraphy and sedimentology.
7) Evolutionary history of the Earth through the recognition of Fossils and the interpretation of the Paleoenvironment including the evolutionary history of man.
8) Basic knowledge and use of the main widely used computer and application programs.
9) Basic English language and scientific terminology relating to the principles of translation and understanding of written texts for at least 4 credits.

Art. 6
Teaching activities and university training credit (Teaching activities and CFU)

Each training activity, prescribed by the degree course detail sheet, is measured in CFU. Each CFU corresponds to 25 hours of overall training commitment[3] per student and includes the hours of teaching activities specified in the curriculum as well as the hours reserved for personal study or other individual training activities.

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

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

- Lecture or guided teaching exercises: 8 hours per CFU;
- Seminar: 5 hours per CFU;
- Laboratory activities or fieldwork: 10-12 hours per CFU;

For Internship and Thesis activities, each credit corresponds to 25 hours of overall training commitment [5].

The CFU corresponding to each training activity acquired by the student is awarded by satisfying the assessment procedures (examination, pass mark) indicated in the Course sheet relating to the course/activity attached to this Didactic Regulations.

Art. 7
Description of teaching methods

The didactic activity is carried out in in accordance with the provisions of a conventional study course.

If necessary, the CCD decides which courses also include teaching activities offered online, according to Ministerial Decree 289 of 25 March 2021 (general guidelines for the three-year planning of universities 2021-2023), in Annex 4, letter A.

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

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

Art. 8
Testing of training activities[6]

1. The CCD, within the prescribed regulatory limits[7], establishes the number of examinations and other means of assessment that determine the acquisition of credits. Examinations are individual and may consist of written, oral, practical, graphical tests, term papers, interviews, or a combination of these modes.
2. The examination procedures published in the course sheets and the examination schedule will be made known to students before the start of classes on the Department's website.[8]

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

[5] For Internship activities (Inter-ministerial Decree 142/1998), subject to further specific provisions, the number of working hours equal to 1 CFU may not be less than 25.

[6] Article 22 of the University Didactic Regulations.

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

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

3. Examinations are held subject to booking, which is made electronically. In case the student is unable to book an exam for reasons that the President of the Board considers justifiable, the student may still be admitted to the examination, following those students already booked.
4. Before examination, the President of the Board of Examiners verifies the identity of the student, who must present a valid photo ID.
5. Examinations are marked out of 30. Examinations involving an assessment out of 30 shall be passed with a minimum mark of 18; a mark of 30 may be accompanied by honours by unanimous vote of the Board. Examinations are marked out of 30 or with a simple pass mark. Assessment following tests other than examinations are marked out with a simple pass mark.
6. Oral exams are open to the public. If written tests are scheduled, the candidate has the right to see his/her paper(s) after correction.
7. Examination Boards are governed by the University Didactic Regulations[9].

Art. 9
Degree Program structure and Study Plan

1. The legal duration of the Degree Program is 2 years
   The student must acquire 120 CFU[10], attributable to the following Types of Training Activities (TAF):
   A) characterising,
   B) related or complementary,
   C) at the student's choice[11],
   D) for the final exam,
   E) further training activities.
2. The degree is awarded after having acquired 120 CFU by passing examinations, not exceeding 12, and the performance of other training activities.
   Unless otherwise provided for in the legal framework of University studies, examinations taken as part of basic, characterising, and related or supplementary activities, as well as activities chosen autonomously by the student (TAF D) are taken into consideration for counting purposes. Examinations or assessments relating to activities independently chosen by the student may be taken into account in the overall calculation corresponding to one unit[12]. Tests constituting an assessment of suitability for the activities referred to in Article 10, paragraph 5, letters d) and e) of Ministerial Decree 270/2004[13] are excluded from the count. Integrated Courses comprising of two or more modules are subject to a single examination.

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

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

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

[12] Pursuant to the D.M. 386/2007.

[13] Art. 10, c. 5 of Ministerial Decree. 270/2004: "In addition to the qualifying training activities, as provided for in paragraphs 1, 2 and 3, Degree Programs shall provide for: a) training activities autonomously chosen by the student as long as they are consistent with the training project [TAF D]; b) training activities in one or more disciplinary fields

3. In order to acquire the CFU relating to independent choice activities, the student is free to choose among all the Course offered by the University, provided that they are consistent with the training project. This consistency is assessed by the Didactic Coordination Commission. Also, for the acquisition of the CFU relating to autonomous choice activities the "passing the exam or other form of profit verification" is required (Art. 5, c. 4 of Ministerial Decree 270/2004). The student can also include internship credits in excess of those foreseen by the regulation among the credits of his choice, subject to approval by the CCD. It is possible to take elective credits even in years other than the one foreseen, if they do not exceed, in total, those required for the entire degree course.
4. The study plan summarises the structure of the Degree Program, listing the envisaged teachings broken down by course year and, in case, by curriculum. At the end, the propedeuticities envisaged by the Degree Program are listed. The study plan offered to students, with an indication of the scientific-disciplinary sectors and the area to which they belong, of the credits, of the type of educational activity, is set out in Annex 1 to this Didactic Regulations.
5. Pursuant to the Art. 11, paragraph 4-bis, of Ministerial Decree 270/2004, it is possible to obtain the Degree according to an individual study plan that also includes educational activities different from those specified in the Didactic Regulations, if they are consistent with degree course detail sheet of the academic year of enrollment. The individual study plan is approved by CCD.

Art. 10
Attendance requirements[14]

1. In general, attendance of lectures is strongly recommended but not compulsory
   In the case of individual courses with compulsory attendance, this option is indicated in the relative teaching/activity course sheet available in Annex 2.1.
2. If the lecturer envisages a different syllabus modulation for attending and non-attending students, this is indicated in the individual Course detail published on the degree course web page and on the teacher's UniNA website.
3. Attendance at seminar activities that award training credits is compulsory. The relative modalities for the attribution of CFU are the responsibility of the CCD.

Art. 11
Prerequisites and prior knowledge

1. The list of incoming and outgoing propedeuticities (necessary to sit a particular examination) can be found at the end of Annex 1.1 and in the teaching/activity course sheet (Annex 2.1).
2. Any prior knowledge deemed necessary is indicated in the individual Teaching Schedule published on the course webpage and on the teacher's UniNA website.

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related or complementary to the basic and characterising ones, also with regard to context cultures and interdisciplinary training [TAF C]; c) training activities related to the preparation of the final exam for the achievement of the degree and, with reference to the degree, to the verification of the knowledge of at least one foreign language in addition to Italian [TAF E]; d) training activities, not envisaged in the previous points, aimed at acquiring additional language knowledge, as well as computer and telematic skills, relational skills, or in any case useful for integration in the world of work, as well as training activities aimed at facilitating professional choices, through direct knowledge of the job sector to which the qualification may give access, including, in particular, training and guidance programs referred to in Decree no. 142 of 25 March 1998 of the Ministry of Labour [TAF F]; e) in the hypothesis referred to in Article 3, paragraph 5, training activities relating to internships and apprenticeships with companies, public administrations, public or private entities including those of the third sector, professional orders and colleges, on the basis of appropriate agreements".

[14] Art. 22, c. 10 of the University Didactic Regulations.

Art. 12
Degree Program Calendar

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

Art. 13
Criteria for the recognition of credits earned in other Degree Programs in the same Class[15]

For students coming from Degree Programs of the same class, the Didactic Coordination Commission ensures the full recognition of CFU, when associated with activities that are culturally compatible with the training Degree Program, acquired by the student at the originating Degree Program, according to the criteria outlined in Article 14 below. Failure to recognise credits must be adequately justified. This is without prejudice to the fact that the number of credits relating to the same scientific-disciplinary sector directly recognised by the student may not be less than 50% of those previously achieved. If the course of origin is carried out in distance mode, the minimum quota of 50% is recognized only if the course of origin is accredited pursuant to the ministerial regulation referred to in article 2, paragraph 148, of the legislative decree 3 October 2006, n. 262, converted by law 24 November 2006, n. 286.

Article 14
Criteria for the recognition of credits acquired in Degree Programs of different classes, in university or university-level Degree Programs, through single courses, at online Universities and in international Degree Programs[16]; criteria for the recognition of credits acquired in extra-curricular activities

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

   Recognition is carried out up to the number of credits envisaged by the didactic system of the Degree Program. Failure to recognise credits must be adequately justified. Pursuant to the Art. 5, c. 5-bis, of Ministerial Decree 270/2004, the acquisition of CFU from other Italian universities is also possible, based on agreements established between the concerned institutions in accordance with the current regulations[17].

[15] Art. 19 of the University Didactic Regulations.
[16] Art. 19 of the University Didactic Regulations.
[17] Art. 6, c. 9 of the University Didactic Regulations.

2. Any recognition of CFU relating to examinations passed as single courses may take place within the limit of 36 CFU, upon request of the interested party and following the approval of the CCD. Recognition may not contribute to the reduction of the legal duration of the Degree Program, as determined by Art. 8, c. 2 of Ministerial Decree 270/2004, except for students who enrol while already in possession of a degree of the same level[18].
3. Regarding the criteria for the recognition of CFU acquired in extra-curricular activities, within the limit of 12 CFU the following activities may be recognised:
   - Professional knowledges, skills, and certified skills, considering the congruence of the activity carried out and/or of the certified skill with the aims and objectives of the Degree Program as well as the hourly commitment of the duration of the activity.
   - Knowledges and skills acquired in post-secondary-level training activities, which the University contributed to develop and implement.

Art. 15
Criteria for enrolment in individual teaching courses

Enrolment in individual teaching courses, provided for by the University Didactic Regulations[19], is governed by the "University Regulations for enrolment in individual teaching courses activated as part of the Degree Program"[20].

Article 16
Features and modalities for the final examination

Characteristics of the final exam

The master's degree in Natural Sciences is achieved after passing a final test, consisting of the discussion of an original experimental research project. The work must be carried out by attending a public or private research laboratory, developed, and carried out by the student, under the guidance of a supervisor and possibly a co-supervisor. A written paper and/or other form of communication appropriate to the research must also be produced in which the problem studied, the experimental approach used, the results obtained and the critical discussion of these are clearly reported. The student must be able to discuss the contents during the final exam of his course of study.

Procedure for carrying out the final exam.

The final test is taken by the candidate before a Commission appointed by the Coordinator of the Course of Studies. The test consists in the presentation of the thesis work carried out under the guidance of a supervisor and in the subsequent discussion with the members of the Commission. The candidate is allowed to make use of an audio-visual support, to be projected publicly, or, alternatively, to draw up a summary booklet, to be delivered in copy to each member of the Commission. At the end of the presentation, each teacher can make comments to the candidate regarding the topic of the thesis work. The presentation has a duration defined by the commission.

Article 17
Guidelines for traineeship and internship

1. Students enrolled in the Degree Program may decide to carry out internships or training periods with organisations or companies that have an agreement with the University. Traineeship and

[18] R.D. No. 3241/2019.
[19] Art. 19, c. 4 of the University Didactic Regulations.
[20] R.D. No. 3241/2019.

internship are not compulsory and contribute to the award of credits for the other training activities chosen by the student and included in the study plan, as provided for by Art. 10, par. 5, letters d and e, of Ministerial Decree 270/2004[21].

2. The modalities and characteristics of traineeship and internship are regulated by the CCD with a specific regulation.
3. The University of Naples Federico II, through the Student Internship Office (http://www.unina.it/didattica/tirocini-studenti), the Incoming and Outgoing Orientation Office, placement and outreach which ensure constant contact with the world of work, to offer students and graduates of the University concrete opportunities, ensures constant contact with the world of work, in order to offer students and graduates of the University concrete opportunities for internships and work experience and to promote their professional integration.

Article 18
Disqualification of student status[22]

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

Article 19
Teaching tasks, including supplementary teaching, guidance, and tutoring activities

1. Professors and researchers carry out the teaching load assigned to them in accordance with the provisions of the RDA and the Regulations on the teaching and student service duties of professors and researchers and on the procedures for self-certification and verification of actual performance[23].
2. Professors and researchers must guarantee at least two hours of reception every 15 days (or by appointment in any case granted no longer than 15 days) and in any case guarantee availability by e-mail.
3. The tutoring service has the task of orienting and assisting students throughout their studies and of removing the obstacles that prevent them from adequately benefiting from attending courses, also through initiatives tailored to the needs and aptitudes of individuals.
4. The University ensures guidance, tutoring and assistance services and activities to welcome and support students. These activities are organised by the Schools and/or Departments under the coordination of the University, as established by the RDA in Article 8.

Article 20
Evaluation of the quality of the activities performed

1. The Didactic Coordination Commission implements all the forms of quality assessment of teaching activities envisaged by the regulations in force according to the indications provided by the University Quality Presidium.
2. In order to guarantee the quality of teaching to the students and to identify the needs of the students and all stakeholders, the University of Naples Federico II uses the Quality Assurance

[21] Traineeships ex letter d can be both internal and external; traineeships ex letter e can only be external.
[22] Art. 24, c. 5 of the University Didactic Regulations.
[23] R.D No. 2482//2020.

(QA)[24] System, developed in accordance with the document "Self-evaluation, Evaluation and Accreditation of the Italian University System" of ANVUR, using:

- surveys on the degree of placement of graduates into the world of work and on post-graduate needs;
- data extracted from the administration of the questionnaire to assess student satisfaction for each course in the curriculum, with questions relating to the way the course is conducted, teaching materials, teaching aids, organisation, facilities.

The requirements deriving from the analysis of student satisfaction data, discussed, and analysed by the Teaching Coordination Committee and the Joint Teachers' and Students' Committee (CPDS), are included among the input data in the service design process and/or among the quality objectives.

3. The QA System developed by the University implements a process of continuous improvement of the objectives and of the appropriate tools to achieve them, ensuring that planning, monitoring, and self-assessment processes are activated in all the structures to allow the prompt detection of problems, their adequate investigation, and the design of possible solutions.

Article 21
Final Rules

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

Article 22
Publicity and Entry into Force

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

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

ANNEX 1.2

DEGREE PROGRAM DIDACTIC REGULATIONS

NATURAL SCIENCES

CLASS LM-60

School: Polytechnic and Basic Sciences

Department: Biology

Regulations in force since the academic year 2024-2025

STUDY PLAN

KEY

Type of Educational Activity (TAF):
B = Characterising
C = Related or Supplementary
D = At the student's choice
E = Final examination and language knowledge
F = Further training activities

Curriculum Management of naturalistic-environmental heritage									
Year I									
Title Course	**SSD**	**Module**	**CREDITS**	**Hours**	**Type Activities** *(lectures, workshops, etc.)*	**Course Modalities** *(in-person, by distance)*	**TAF**	**Disciplinary area**	**Mandatory/ optional**
Descriptive and inferential statistics with laboratory	SECS/S/01	single	6	52	Frontal lesson and laboratory	In-person	B	Chemical, physical, mathematical and computer science disciplines	Mandatory
Geomorphology Ecology and evolution of the landscape	GEO/04	Geomorphology and landscape evolution	6	48	Frontal lesson	In-person	B	Ecological disciplines	Mandatory
	BIO/07	Landscape ecology	6	48	Frontal lesson	In-person	B	Ecological disciplines	Mandatory
Plant evolution and phylogeny with laboratory	BIO/01	Plant evolution with laboratory	6	52	Frontal lesson	In-person	B	Biological disciplines	Mandatory

	BIO/02	Plant phylogeny with laboratory	6	52	Frontal lesson and laboratory	In-person	B	Biological disciplines	Mandatory
Animal evolution and phylogeny with laboratory	BIO/05	Animal evolution with laboratory	6	52	Frontal lesson and laboratory	In-person	B	Biological disciplines	Mandatory
	BIO/05	Animal phylogeny with laboratory	6	52	Frontal lesson and laboratory	In-person	B	Biological disciplines	Mandatory
Optional course		single	6	52	Frontal lesson and laboratory	In-person	C	Related or Supplementary	Mandatory
At the student's choice activity		single	6	48	Frontal lesson	In-person/by distance	D	At the student's choice	Mandatory

Year II

Title course	**SSD**	**Module**	**CREDITs**	**Hours**	**Type Activities** ***(lectures, workshops etc.)***	**Course Modalities** ***(in-person, by distance)***	**TAF**	**Disciplinary area**	**Mandatory / optional**
Environmental impact assessment with laboratory	ICAR/15	single	6	52	Frontal lesson and laboratory	In-person	B	Agricultural, management and communication disciplines	Mandatory
Geosciences for the environment and territory with laboratory	GEO/05	Geology applied to the territory with laboratory	6	52	Frontal lesson and laboratory	In-person	B	Earth Sciences disciplines	Mandatory
	GEO/09	Mineralogy applied to the environment and cultural heritage with laboratory	6	52	Frontal lesson	In-person	B	Earth Sciences disciplines	Mandatory
Optional course		single	6	52	Frontal lesson and laboratory	In-person	C	Related or Supplementary	Mandatory
At the student's choice activity		single	6	48	Frontal lesson	In-person/by distance	D	At the student's choice	Mandatory
English language laboratory 2	LIN/12	single	4	32	Frontal lesson	In-person/by distance	F	Additional linguistic knowledge	Mandatory
Further training activities		single	5	125	Laboratory	In-person/by distance	F	Other useful knowledge for entering the world of work	Mandatory
Thesis activity			27	675			E	For the final test	Mandatory

Curriculum Conservation and Global Change

Year I

Title Course	SSD	Module	CREDITS	Hours	Type Activities *(lectures, workshops, etc.)*	Course Modalities *(in-person, by distance)*	TAF	Disciplinary area	Mandatory/ optional
Descriptive and inferential statistics with laboratory	SECS/S/01	single	6	52	Frontal lesson and laboratory	In-person	B	Chemical, physical, mathematical and computer science disciplines	Mandatory
Geomorphology Ecology and evolution of the landscape	GEO/04	Geomorphology and landscape evolution	6	48	Frontal lesson	In-person	B	Ecological disciplines	Mandatory
	BIO/07	Landscape ecology	6	48	Frontal lesson	In-person	B	Ecological disciplines	Mandatory
Plant evolution and phylogeny with laboratory	BIO/01	Plant evolution with laboratory	6	52	Frontal lesson and laboratory	In-person	B	Biological disciplines	Mandatory
	BIO/02	Plant phylogeny with laboratory	6	52	Frontal lesson and laboratory	In-person	B	Biological disciplines	Mandatory
Animal evolution and phylogeny with laboratory	BIO/05	Animal evolution with laboratory	6	52	Frontal lesson and laboratory	In-person	B	Biological disciplines	Mandatory
	BIO/05	Animal phylogeny with laboratory	6	52	Frontal lesson and laboratory	In-person	B	Biological disciplines	Mandatory
Optional course		single	6	52	Frontal lesson and laboratory	In-person	C	Related or Supplementary	Mandatory
At the student's choice activity		single	6	48	Frontal lesson	In-person/by distance	D	At the student's choice	Mandatory
English language laboratory 2	LIN/12	single	4	32	Frontal lesson	In-person/by distance	F	Additional linguistic knowledge	Mandatory

Year II

Title course	SSD	Module	CREDITs	Hours	Type Activities *(lectures, workshops etc.)*	Course Modalities *(in-person, by distance)*	TAF	Disciplinary area	Mandatory/ optional
Global environmental risks	MED/42	single	6	48	Frontal lesson	In-person	B	Agricultural,management and communication disciplines	Mandatory

Biogeochemical cycles and energy transition	BIO/19	Geomicrobiology and biogeochemical cycles	6	48	Frontal lesson	In-person	C	Related or Supplementary	Mandatory
	GEO/02	Resources and Energy Transition	6	48	Frontal lesson	In-person	C	Related or Supplementary	Mandatory
Conservation Paleobiology	GEO/01	Global change and risk of extinction	6	48	Frontal lesson	In-person	B	Earth Sciences disciplines	Mandatory
	GEO/01	Species distribution models and climate change	6	48	Frontal lesson	In-person	B	Earth Sciences disciplines	Mandatory
At the student's choice activity		single	6	48	Frontal lesson	In-person/by distance	D	At the student's choice	Mandatory
Further training activities		single	5	125	Laboratory	In-person/by distance	F	Other useful knowledge for entering the world of work	Mandatory
Thesis activity			21	525			E	For the final test	Mandatory

Optional courses (related or supplementary)

Title course	**SSD**	**Module**	**CREDITs**	**Hours**	**Type Activities *(lectures, workshops etc.)***	**Course Modalities *(in-person, by distance)***
GIS and geotematic cartography with laboratory	GEO/04	single	6	52	Frontal lesson with laboratory	In-person
Volcanology and landscape aspects of the volcanic areas with laboratory	GEO/08	single	6	52	Frontal lesson with laboratory	In-person
Naturalistic museology	GEO/01	single	6	48	Frontal lesson	In-person
Paleontology of vertebrates with laboratory	GEO/01	single	6	52	Frontal lesson with laboratory	In-person
Hydrogeological monitoring for the protection of natural ecosystems with laboratory	GEO/05	single	6	52	Frontal lesson with laboratory	In-person
Evolutionary paleontology	GEO/01	single	6	48	Frontal lesson	In-person
Natural risks: quantification and predictability	GEO/10	single	6	48	Frontal lesson	In-person
Conservation genetics with laboratory	BIO/18	single	6	52	Frontal lesson with laboratory	In-person
Biology and ecology of pollination	BIO/03	single	6	48	Frontal lesson	In-person
Mediterranean geobotanic with laboratory	BIO/03	single	6	52	Frontal lesson with laboratory	In-person

Management and enhancement of animal biodiversity with laboratory	BIO/05	single	6	52	Frontal lesson with laboratory	In-person
Global risks to animal biodiversity	BIO/05	single	6	48	Frontal lesson	In-person
Vertebrate zoology	BIO/05	single	6	52	Frontal lesson with laboratory	In-person
Biochemical flows and global change	BIO/10	single	6	48	Frontal lesson	In-person
Management and enhancement of vegetable biodiversity with laboratory	BIO/02	single	6	52	Frontal lesson with laboratory	In-person
Molecular biology of evolutionary processes	BIO/11	single	6	48	Frontal lesson	In-person

At the student's choice course						
Title course	**SSD**	**Module**	**CREDITs**	**Hours**	**Type Activities** ***(lectures, workshops etc.)***	**Course Modalities** ***(in-person, by distance)***
Archeometry for cultural heritage	GEO/07	single	6	48	Frontal lesson	In-person
Climatology	GEO/12	single	6	48	Frontal lesson	In-person
Management and conservation of paleontological material	GEO/01	single	6	48	Frontal lesson	In-person
Optical microscopy for the study of rocks	GEO/07	single	6	48	Frontal lesson	In-person
Impact of global changes on natural and anthropic plant systems	BIO/03	single	6	48	Frontal lesson	In-person
Sustainability science	BIO/07	single	6	48	Frontal lesson	In-person
Responses and adaptation of vegetable organisms to environmental stress and climate change	BIO/04	single	6	48	Frontal lesson	In-person
Molecular techniques in systematic and plant phylogenesses	BIO/02	single	6	48	Frontal lesson	In-person

List of propaedeuticities

Propaedeuticities are indicated in the Teaching in the Annex 2.1

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

NATURAL SCIENCE

CLASS LM-60

School: Polytechnic of Basic Sciences

Department: Biology

Didactic Regulations in force since the academic year 2024-2025

Curriculum Management of naturalistic-environmental heritage

Course: Descriptive and inferential statistics with laboratory	**Teaching Language:** Italian
SSD (Subject Areas): SECS-S/01	**CREDITS:** 6
Course year: first	**Type of Educational Activity:** **B-** Characterizing
Teaching Methods: In-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector addresses issues relating to data analysis, the design and implementation of investigations and experiments in different application sectors, for descriptive, interpretative and decision-making purposes. It therefore includes the theoretical and methodological developments of descriptive, exploratory and inferential statistics in their various articulations such as mathematical statistics, sample theory, experimental design, statistical analysis of multivariate data, statistical analysis of time and spatial series.	
Objectives: The course aims to provide students with basic knowledge on the procedures for statistical evaluation of naturalistic data, on populations, communities and ecosystems. As well as the methodological tools to operate with specific software on real cases in the Italian territory.	
Propaedeuticities: None **Is a propaedeuticity for:** None	
Types of examinations and other tests: Oral examination	

Course: Geomorphology, ecology and landscape evolution	**Teaching Language:** Italian
SSD (Subject Areas): GEO/04 BIO/07	**CREDITS:** 6 6

Course year: first	**Type of Educational Activity:** **B-** Characterizing **B-** Characterizing

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The GEO/04 sector deals with the study of the "environmental system" through the analysis of the elements and physical processes connected with the exogenous dynamics of the geosphere, the experimental and theoretical study of the shapes of the earth's surface, the climate, the hydrosphere and of the cryosphere; the assessment of geomorphological risks and environmental resources.
The BIO/07 sector studies natural, anthropized, urban-industrial ecosystems and their organization in landscape systems, landscape structure and dynamics, patterns, processes and scale (spatial and temporal), landscape types, diversity, heterogeneity, connectivity and fragmentation, biodiversity and landscape, man and landscape, ecosystem services, conservation and management of landscape and ecosystems. Ecological aspects of environmental restoration and recovery. Ecological networks. Habitats Directive (92/43/EEC) and Natura 2000 network.

Objectives:
Understanding of the genesis of the main groups of forms present on the terrestrial relief; acquisition of reading and analysis skills of the shapes that make up terrestrial landscapes, also through the reading of cartographic representations.
The main objective of the Course is also to provide students with the cultural tools necessary for a first approach to Landscape Ecology. Particular attention will be paid to the evolution of the man-landscape-nature relationship over time, to the consequent birth of Landscape Ecology, to the importance of the systemic and interdisciplinary approach and to the heuristic value of the spatial and temporal scales that represent the dimensions within which all contexts are explained. The course also aims to understand the genesis of the main groups of forms present on the terrestrial relief; acquisition of reading and analysis skills of the forms that make up landscapes terrestrial, also through the reading of cartographic representations.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Plant evolution and phylogeny with laboratory	**Teaching Language:** Italian

SSD (Subject Areas):	**CREDITS:**
BIO/01	6
BIO/02	6

Course year: first	**Type of Educational Activity:** **B-** Characterizing **B-** Characterizing

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
(BIO/01): The sector studies plant biology at all levels of organization, including autotrophic prokaryotes, algae and fungi, as well as their symbioses. General Botany investigates, theoretically and experimentally, the aspects of structural and functional organization and their evolution of these organisms, to establish their relationships and interpret, from an evolutionary perspective, their structures and functions, as well as their reproductive mechanisms.
(BIO/02): “Systematic Botany has as its object the taxonomic and biological diversity of plants… their evolution and affinity relationships…”; “Tools of Systematic Botany are the acquisition, synthesis and comparative analysis of chorological, biological-reproductive, populationistic, paleobotanical, palynological, morpho-anatomical,

histological, cytological, cytogenetic, phytochemical, genomic and molecular information. This information is processed ... with phylogenetic and cladistic criteria".

Objectives:
Provide theoretical knowledge and understanding, ability to learn, application skills (also developed with practical laboratories) and communication skills relating to the evolution and study of plant phylogeny.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Animal evolution and phylogeny with laboratory	**Teaching Language:** Italian
SSD (Subject Areas): BIO/05 BIO/05	**CREDITS:** 6 6
Course year: first	**Type of Educational Activity:** **B-** Characterizing **B-** Characterizing

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Study of protozoans, metazoans and their evolution at population, species and community levels. Research, conducted through theoretical and experimental methodologies, in the field and in the laboratory, investigates functional organization, reproduction, morphogenesis, development, systematics and phylogenesis.

Objectives:
Knowledge of the evolution of animal diversity and methodological tools for the study of evolutionary relationships between animal phyla. Develop ability to operate in the field of biodiversity conservation and management of museum collections.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Environmental impact assessment with laboratory	**Teaching Language:** Italian
SSD (Subject Areas): ICAR/15	**CREDITS:** 6
Course year: second	**Type of Educational Activity:** **B-** Characterizing

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The scientific-disciplinary contents have as their object the landscape structure of the territory, of the unbuilt areas and open spaces, as well as the organization of greenery, as a system within which the built part of the cities and the territory is located. Recognizing environmental diversity and historical, cultural, ecological and aesthetic pre-existences as founding elements and the valorization of ecology procedures in design processes as a qualifying character, they include activities relating to landscaping planning and management of the territory, the design of

green systems urban planning, the redevelopment and recovery of degraded areas, the design of gardens and parks, the landscape inclusion of infrastructures and the control of landscape evolution.

Objectives:

The course aims to provide students with basic knowledge on the procedures for assessing the impact of anthropogenic works on natural systems. As well as the methodological tools to operate in the field on real cases in the Italian territory.

Propaedeuticities:

None

Is a propaedeuticity for:

None

Types of examinations and other tests:

Oral examination

Course: Geosciences for the environment and territory with laboratory	**Teaching Language:** Italian
SSD (Subject Areas): GEO/05 GEO/09	**CREDITS:** 6 6
Course year: second	**Type of Educational Activity:** **B-** Characterizing **B-** Characterizing

Teaching Methods:

In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

The GEO/05 sector studies soil protection, hydrogeology, thematic cartography, aimed at urban and territorial planning. including hydrogeological risk assessment. The GEO/09 sector studies the valorization of mineral raw materials and the characterization of minerals and rocks of industrial interest, their synthetic analogues and transformation products, their technology, industrial applications; interaction with the environment, archaeometric applications, conservation of stone materials used for works of historical-artistic interest as well as environmental recovery. The sector also takes care of scientific education and geoscience teaching.

Objectives:

The course's topics are: (i) the role of geosciences in land planning and the influence that geo-environmental risks can have on land management; the assessment of geological risks, for their prevention and prediction and for the management of human impacts on the environment. (ii) the study of industrial minerals and stone materials (geomaterials) used in the sector of environmental protection (the former) and as constituents of cultural heritage (the latter) with regard to those of the historical architecture of Campania. Case studies and laboratory activities will be defined.

Propaedeuticities:

None

Is a propaedeuticity for:

None

Types of examinations and other tests:

Oral examination

Curriculum Conservation and Global Change

Course: Descriptive and inferential statistics with laboratory	**Teaching Language:** Italian
SSD (Subject Areas): SECS-S/01	**CREDITS:** 6
Course year: first	**Type of Educational Activity:** **B-** Characterizing

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector addresses issues relating to data analysis, the design and implementation of investigations and experiments in different application sectors, for descriptive, interpretative and decision-making purposes. It therefore includes the theoretical and methodological developments of descriptive, exploratory and inferential statistics in their various articulations such as mathematical statistics, sample theory, experimental design, statistical analysis of multivariate data, statistical analysis of time and spatial series.

Objectives:
The course aims to provide students with basic knowledge on the procedures for statistical evaluation of naturalistic data, on populations, communities and ecosystems. As well as the methodological tools to operate with specific software on real cases in the Italian territory.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course:	**Teaching Language:**
Geomorphology, ecology and landscape evolution	Italian

SSD (Subject Areas):	**CREDITS:**
GEO/04	6
BIO/07	6

Course year: first	**Type of Educational Activity:** **B-** Characterizing **B-** Characterizing

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The GEO/04 sector deals with the study of the "environmental system" through the analysis of the elements and physical processes connected with the exogenous dynamics of the geosphere, the experimental and theoretical study of the shapes of the earth's surface, the climate, the hydrosphere and of the cryosphere; the assessment of geomorphological risks and environmental resources.
The BIO/07 sector studies natural, anthropized, urban-industrial ecosystems and their organization in landscape systems, landscape structure and dynamics, patterns, processes and scale (spatial and temporal), landscape types, diversity, heterogeneity, connectivity and fragmentation, biodiversity and landscape, man and landscape, ecosystem services, conservation and management of landscape and ecosystems. Ecological aspects of environmental restoration and recovery. Ecological networks. Habitats Directive (92/43/EEC) and Natura 2000 network.

Objectives:
Understanding of the genesis of the main groups of forms present on the terrestrial relief; acquisition of reading and analysis skills of the shapes that make up terrestrial landscapes, also through the reading of cartographic representations.
The main objective of the Course is also to provide students with the cultural tools necessary for a first approach to Landscape Ecology. Particular attention will be paid to the evolution of the man-landscape-nature relationship over time, to the consequent birth of Landscape Ecology, to the importance of the systemic and interdisciplinary approach and to the heuristic value of the spatial and temporal scales that represent the dimensions within which all contexts are explained. The course also aims to understand the genesis of the main groups of forms present on the terrestrial relief; acquisition of reading and analysis skills of the forms that make up landscapes terrestrial, also through the reading of cartographic representations.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course:
Plant evolution and phylogeny with laboratory

Teaching Language:
Italian

SSD (Subject Areas):
BIO/01
BIO/02

CREDITS:
6
6

Course year: first

Type of Educational Activity: **B-** Characterizing
B- Characterizing

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
(BIO/01): The sector studies plant biology at all levels of organization, including autotrophic prokaryotes, algae and fungi, as well as their symbioses. General Botany investigates, theoretically and experimentally, the aspects of structural and functional organization and their evolution of these organisms, to establish their relationships and interpret, from an evolutionary perspective, their structures and functions, as well as their reproductive mechanisms.
(BIO/02): “Systematic Botany has as its object the taxonomic and biological diversity of plants… their evolution and affinity relationships…”; “Tools of Systematic Botany are the acquisition, synthesis and comparative analysis of chorological, biological-reproductive, populationistic, paleobotanical, palynological, morpho-anatomical, histological, cytological, cytogenetic, phytochemical, genomic and molecular information. This information is processed ... with phylogenetic and cladistic criteria".

Objectives:
Provide theoretical knowledge and understanding, ability to learn, application skills (also developed with practical laboratories) and communication skills relating to the evolution and study of plant phylogeny.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course:
Animal evolution and phylogeny with laboratory

Teaching Language:
Italian

SSD (Subject Areas):
BIO/05
BIO/05

CREDITS:
6
6

Course year: first

Type of Educational Activity: **B-** Characterizing
B- Characterizing

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Study of protozoans, metazoans and their evolution at population, species and community levels. Research, conducted through theoretical and experimental methodologies, in the field and in the laboratory, investigates functional organization, reproduction, morphogenesis, development, systematics and phylogenesis.

Objectives:

Knowledge of the evolution of animal diversity and methodological tools for the study of evolutionary relationships between animal phyla. Develop ability to operate in the field of biodiversity conservation and management of museum collections.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Global environmental risks	**Teaching Language:** Italian
SSD (Subject Areas): MED/42	**CREDITS:** 6
Course year: second	**Type of Educational Activity:** **B**- Characterizing

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector is interested in scientific and educational-training activities in the field of general and applied hygiene; the sector has specific expertise in the field of hygiene applied to the environment, community medicine, preventive medicine, epidemiology and public health.

Objectives:
The course aims to provide students with basic knowledge on the spread of pathogens and the implications of environmental risks in terms of impact on human health and biodiversity. The objective is to provide a solid basis for understanding the key aspects related to the management and prevention of these risks.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Biogeochemical Cycles and Energy Transition	**Teaching Language:** Italian
SSD (Subject Areas): BIO/19 GEO/02	**CREDITS:** 6 6
Course year: second	**Type of Educational Activity:** **C**- Related or Supplementary **C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The BIO/19 sector studies the interactions of all microorganisms, including viruses, as simple models for the study and understanding of biological processes; the distribution of microorganisms in nature and the role they play in the environment.
The skills of the GEO/12 sector include: the geochronological reconstruction of the physical and biological events that occurred during the history of the earth; the analysis of stratigraphic successions, the detection of current and fossil sedimentary bodies, their description, organization and spatial and temporal association, the analysis of the facies and evolution of sedimentary basins. Participates in geological applications in the environmental and impact

assessment fields, in the mitigation of natural risks, in the procurement of georesources and in the management of natural assets.

Objectives:
The course aims to provide students with basic knowledge on two aspects: diffusion of pollutants and pathogens, and on techniques and measures for prevention and study of their diffusion. Basic knowledge of energy production principles. Analysis of the various energy sources, their economic and financial impact, emissions and costs. Practical role of natural and geological sciences in the energy transition.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Conservation paleobiology	**Teaching Language:** Italian
SSD (Subject Areas): GEO/01 GEO/01	**CREDITS:** 6 6
Course year: second	**Type of Educational Activity:** **B-** Characterizing **B-** Characterizing

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector deals with the study of life in the geological past in order to reconstruct its history, to interpret and place evolutionary events and processes in time in the light of fossil evidence, made up of organic remains and traces of activity. Its task is the systematic and phylogenetic classification of fossils, the reconstruction in space and time of paleocommunities and their relationships, the study of preservation mechanisms and the analysis of the sedimentogenetic role. The main applications concern the use of fossils as indicators of age and environment, for the purpose of constructing time scales and paleoenvironmental, paleoclimatic, paleoceanographic and paleogeographic reconstruction.

Objectives:
The course aims to provide in-depth knowledge regarding the macroevolutionary mechanisms correlated with the risk of extinction, to acquire the means and skills necessary to learn the climatic preferences and environmental needs of species and to quantify the effects of current changes in the future.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination
Project work

Optional courses (related or supplementary)

Course: GIS and geothematic cartography with laboratory	**Teaching Language:** Italian
SSD (Subject Areas): GEO/04	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity:** **C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Evaluation of geomorphological risks and environmental resources based on analysis methods and techniques, such as photointerpretation, remote sensing and processing also with the use of models.

Objectives:
Provide knowledge to read, interpret and process geothematic maps in a GIS environment, starting from topographic and aerial photogrammetric bases at different scales.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Practical test and Oral examination

Course: Volcanology and landscape aspects of volcanic areas with laboratory	**Teaching Language:** Italian
SSD (Subject Areas): GEO/08	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Volcanology studies the eruptive activity and geology of volcanic areas both in relation to their origin and to the evolution of magmas, which depends on the dynamics of ascent, eruption, transport and deposition of products, with the methods of petrography, geochemistry, geology and geophysics. The sector expertise, based on experimental and modeling approaches, as well as on direct observation of phenomena, are also essential in the understanding of geodynamic processes, in the quantification and mitigation of risks associated with volcanic activity, and in the procurement and exploitation of geothermal energy (annex B DM 30 October 2015 n. 855).

Objectives:
The course aims to provide students with the basic notions about volcanic phenomena starting from the trigger of eruptions up to their impact on the territory and their implications in landscape-environmental terms. Particular emphasis will be dedicated to the ability of large eruptions to quickly bury the territory surrounding volcanoes, preserving, as in Pompeii, Herculaneum and Akrotiri, all the material aspects of ancient human settlements.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Written examination
Discussion of project work

Course: Naturalistic museology	**Teaching Language:** Italian
SSD (Subject Areas): GEO/01	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector deals with the techniques of recovery, conservation, management and use of paleontological assets in the territory and in museum structures, naturalistic museology, scientific education and geoscience teaching.

Objectives:
Provide basic knowledge of the "museum" phenomenon and its management, taking care of aspects such as the historical importance of the collections and the exhibition criteria of the geo-naturalistic finds as well as the cultural impact of the collections themselves. The course also provides essential knowledge about the organization and differentiation between the various types of scientific museums in relation to their educational and cultural aspects, as well as the issues relating to the management and care/conservation of collections.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Vertebrate Palaeontology with laboratory	**Teaching Language:** Italian
SSD (Subject Areas): GEO/01	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The course deals with the study of fossil vertebrates in order to reconstruct their history, to interpret and place evolutionary events and processes in time in the light of fossil evidence, made up of organic remains and traces of activity. It also analyzes major biological crises in order to interpret global changes with reference also to recent ones.

Objectives:
Training of specialists in Paleontology and Taphonomy of vertebrates, to lead research and excavation expeditions for the SSBBAA, organize exhibitions and conferences at Natural Science Museums, local authorities.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Hydrogeological monitoring for the protection of natural ecosystems with laboratory	**Teaching Language:** Italian
SSD (Subject Areas): GEO/05	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

Contents extracted from the SSD declaration consistent with the training objectives of the course:
The skills of this sector include: soil protection, with particular attention to landslides, deep slope gravitational deformations, subsidence and geopedology; hydrogeology, with reference to the research of aquifers in various geological contexts, the study of underground water circulation, the assessment of the vulnerability of aquifers, their management and defense against pollution; the technical characterization of loose and stony rocks, also based on the stability of the slopes; the geological-technical survey, the geological exploration of the subsoil and thematic cartography, aimed at urban and territorial planning, including the assessment of environmental impact and hydrogeological risk.

Objectives:

Provide the basic hydrogeological knowledge necessary for optimal management of underground water resources, fundamental for the study, protection and enhancement of natural ecosystems. The acquisition, processing and interpretation of basic hydrogeological data will be developed in such a way as to allow correlations with other similar disciplines and stimulate an interdisciplinary approach to the conservation and valorization of biodiversity. Particular attention will be paid to the quantitative analysis of water infiltration phenomena and the interaction processes between surface and groundwater, based on the main bioindicators and current environmental legislation.

Propaedeuticities:

None

Is a propaedeuticity for:

None

Types of examinations and other tests:

Oral examination

Course: Evolutionary palaeontology	**Teaching Language:** Italian
SSD (Subject Areas): GE0/01	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: C**- Related or Supplementary

Teaching Methods:

In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

The sector is interested in the reconstruction of paleoenvironments and the evolution of life in the past. The scientific contents of the sector form the basis of geoscience teaching, basic scientific education/dissemination, naturalistic museology, and the identification, characterization and conservation of geo-palaeontological sites. Paleontology deals with the study of life in the geological past in order to reconstruct its history, to interpret and place evolutionary events and processes in time in the light of fossil evidence, made up of organic remains and traces of activity. Some of the aims are the systematic and phylogenetic classification of fossils, the reconstruction in space and time of paleocommunities and their relationships. It also analyzes major biological crises in order to interpret global changes with reference also to recent ones.

Objectives:

Understanding of micro and macroevolutionary dynamics, acquisition of the basic techniques necessary for the study of evolutionary processes.

Propaedeuticities:

None

Is a propaedeuticity for:

None

Types of examinations and other tests:

Oral examination with numerical exercises

Course: Natural risks: quantification and predictability	**Teaching Language:** Italian
SSD (Subject Areas):	**CREDITS:**

GEO/10	6
Course year: first/second	**Type of Educational Activity: C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector is interested in the study of the structure of the Solid Earth, in its superficial and deep parts, the physical processes that characterize it, also in relation to the fluid components of the Earth, and the danger connected to natural events (seismic, volcanic, tsunamis). The research activities are based on the development of physical-mathematical models and quantitative physical-mathematical, IT and statistical analyzes of geophysical data oriented towards the study of the processes that characterize the Solid Earth in the present and past states and in their possible evolution future.

Objectives:
The course aims to provide students with in-depth knowledge of advanced techniques for estimating hazards and risks with their uncertainties, their applications to some of the major natural risks, and introductory notes on methodologies for risk reduction.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Discussion of project work

Course: Conservation genetics	**Teaching Language:** Italian
SSD (Subject Areas): BIO/18	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector studies the methods of transmission, modification and expression of hereditary characteristics at the level of prokaryotic and eukaryotic cells, individuals and populations. Analyzes the structure and evolution of genes and genomes. Investigates the genetic and molecular basis of evolution.

Objectives:
The course aims to provide students with the basic notions of the transmission of hereditary characteristics. Furthermore, it aims to introduce students to the causes and effects of genetic variability and the evolutionary dynamics of populations. The aim of the course is to understand the classic and cutting-edge methodologies for the evaluation of the genetic diversity of populations and the conservation strategies of natural populations. It deals with practical applications of Genetics and the molecular technologies derived from it.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Biology and ecology of pollination	**Teaching Language:** Italian
SSD (Subject Areas):	**CREDITS:**

BIO/03	6
Course year: first/second	**Type of Educational Activity: C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector studies the distribution, adaptive strategies, use of resources, interrelationships with the environment of prokaryotic and eukaryotic photosynthetic living beings as well as the mechanisms through which organisms grow, reproduce and interact during development as well as functional interactions and structural aspects between the different components of the environmental system at a multi-temporal and multi-spatial level also in relation to the alterations induced by anthropic activities. It also studies nature conservation, environmental impact assessment, the floristic-vegetation aspects of environmental design, the monitoring of natural resources, also in relation to global changes.

Objectives:
Allow the acquisition of in-depth knowledge on pollination strategies in flowering plants and on the inherent evolutionary and ecological dynamics. The acquisition of this knowledge will allow the learner to be directed towards the development of professional figures involved in the management and monitoring of pollination and pollination networks.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Mediterranean geobotany with laboratory	**Teaching Language:** Italian
SSD (Subject Areas): BIO/03	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector studies the distribution, adaptive strategies, use of resources, interrelationships with the environment of prokaryotic and eukaryotic photosynthetic living things, as well as fungi, using the different approaches of botany, geobotany, plant ecology, biology applied plant and landscape ecology, both in terms of models and in terms of applications. It deepens knowledge on floristic and vegetation diversity at different levels of biological organization and in different pedoclimatic conditions. He studies chorology, autoecology, synecology and classification of vegetation in phytocenographic, phytosociological and syndynamic terms, as well as the functional and structural interactions between the different components of the environmental system at a multi-temporal and multi-spatial level also in relation to the alterations induced by anthropic activities. Further skills concern: aerobiology, the definition of environmental quality, nature conservation, environmental impact assessment, the floristic-vegetative aspects of environmental design and environmental education aimed at the study of ecological complexity and compatible and to the monitoring of natural resources, also in relation to global changes.

Objectives:
Provide in-depth knowledge on plant associations and plant distribution patterns with particular attention to the Mediterranean environment. Furthermore, the course will allow the acquisition of skills that can contribute to the training of professional figures such as botanist and naturalist.

Propaedeuticities:
None

Is a propaedeuticity for:

None

Types of examinations and other tests:
Oral examination

Course:
Management and enhancement of animal biodiversity with laboratory

Teaching Language:
Italian

SSD (Subject Areas):
BIO/05

CREDITS:
6

Course year: first/second

Type of Educational Activity: C- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Biodiversity definitions and considerations. Strategies for conservation and valorization. The monitoring of animal biodiversity and faunal aspects of the environmental impact assessment and in that of the management and conservation of fauna.

Objectives:
The main objective of the teaching is to provide students with the theoretical knowledge and practical skills to understand the main techniques for managing and enhancing animal biodiversity. Knowledge of the main management techniques for the purposes of wildlife conservation.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course:
Global risks to animal biodiversity

Teaching Language:
Italian

SSD (Subject Areas):
BIO/05

CREDITS:
6

Course year: first/second

Type of Educational Activity: C- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector deals with the study of protozoans, metazoans and their evolution at various levels of organisation, cellular, organismal, population and species, and community. In particular, the research, conducted through theoretical and experimental methodologies, in the field and in the laboratory, investigates functional organization, reproduction, morphogenesis and development, ecophysiology, behavior, intra- and interspecific interactions and with the environment, biogeography, systematics and phylogeny. Other disciplines in the sector have application relevance in the field of animal biotechnology, in that of monitoring animal biodiversity and faunal aspects of environmental impact assessment and in that of fauna management and conservation.

Objectives:
The main objective of the teaching is to provide students with the theoretical knowledge and practical skills to understand the main threats affecting the loss of animal biodiversity.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:

Oral examination

Course:
Vertebrate zoology

Teaching Language:
Italian

SSD (Subject Areas):
BIO/05

CREDITS:
6

Course year: first/second

Type of Educational Activity: C- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Study of metazoans and their evolution at the levels of organization, cellular, organismal, population and species, and community. Research, conducted through theoretical and experimental methodologies, in the field and in the laboratory, on functional organization, biogeography, systematics and phylogeny.

Objectives:
Acquisition of knowledge on the anatomy, physiology, ecology, evolutionary history and classification of vertebrates. Acquisition of skills in the classification and recognition of vertebrates through practical activities on models and/or museum specimens' representative of the different taxa.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course:
Biochemical flows and global change

Teaching Language:
Italian

SSD (Subject Areas):
BIO/10

CREDITS:
6

Course year: first/second

Type of Educational Activity: C- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The chemistry of living matter starting from its preparatory bases, the biological processes at the molecular level; the biochemical mechanisms of cell functions; biochemical interactions between organisms and between organisms and the environment; the biochemistry of the environment, pollution, cultural heritage; computational biochemistry and bioinformatics.

Objectives:
The course aims to provide students with the rudiments of biochemical modeling, i.e. the tools necessary to model biochemical flows at different scales, with particular attention to the ability to understand the limits and potential of the models produced.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course:
Management and enhancement of plant biodiversity with laboratory

Teaching Language:
Italian

SSD (Subject Areas): BIO/02	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
"Systematic Botany has as its object the taxonomic and biological diversity of plants…"; "Systematic Botany includes field floristic survey, recognition and constitution of elementary taxa"; "Tools of Systematic Botany are the acquisition, synthesis and comparative analysis of chorological, biological-reproductive, populationistic information, …"

Objectives:
The course intends to provide the basis for the knowledge of the plant diversity of vascular plants at the species and community level and of the methodologies (chorological and populationistic) useful for the evaluation of their conservation status to implement safeguard measures.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Molecular biology of evolutionary processes	**Teaching Language:** Italian
SSD (Subject Areas): BIO/11	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: C**- Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Molecular biology studies the biological functions of informational macromolecules at the molecular level. Of interest in this sector is the analysis of the biochemical and evolutionary characteristics of nucleic acids, the interactions between nucleic acids and proteins, between proteins and proteins. Particular attention is paid to the macromolecules that are involved in the conservation, repair, duplication, transcription and translation of the information contained in nucleic acids, to the macromolecules that are responsible for the phenomena of control of gene expression, proliferation, differentiation and cellular transformations, the interaction between cells, the development of animal organisms. The above topics are addressed using biochemical characterization methods of biological macromolecules and bioinformatic tools.

Objectives:
The course has the educational objective of providing advanced knowledge in the field of molecular biology and its application. Through the use of cutting-edge methods of molecular biology, the student will be guided towards understanding evolutionary dynamics and molecular mechanisms.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

At Student's choice courses

Course: Archaeometry for cultural heritage	**Language of teaching:** Italian
SSD: GEO/07	**CFU:** 6
Course year: first/second	**Type of Training Activity: D –** At the student's choice
Course delivery mode: In-Person	
Contents extracted from the SSD declaration in line with the training objectives of the course: Application studies with a special focus on coherent and incoherent rocks of industrial, environmental, and cultural interest. The contents of these studies find effective expression in naturalistic museology, the management of natural resources, scientific education and geoscience teaching.	
Learning goals: The course Archaeometry for Cultural Heritage aims at providing the basic knowledge for the characterization of archaeological finds and other cultural heritage materials focusing on those artifacts obtained from raw materials of geological origin. A brief archaeological overview will be provided along with the main issues to be addressed by means of methodologies typical of geosciences. The analytical methods applied to provenance studies and ancient production technologies will be presented. In addition, great attention will be paid to the most advanced analytical techniques for non-destructive diagnostics applied to the investigation of historical-archaeological monuments and artifacts. Laboratory activities will allow students to become familiar with destructive and non-destructive analytical techniques used in archaeometry and Cultural Heritage diagnostics.	
Prerequisites for entry: Not required **Outgoing preparatory steps:** Not required	
Examination and Evaluation criteria: Oral examination Project work	

Couse: Climatology	**Language of teaching:** Italian
SSD: GEO/12	**CFU:** 6
Year of study: first/second	**Type of Training Activity: D –** At the student's choice
Method of execution: In-Person	
Contents extracted from the SSD declaration consistent with the training objectives of the course: The competencies of the sector concern the physical processes that characterize the dynamics of terrestrial fluids with a specific scale, as well as the goals of Earth Sciences and their environmental applications. In particular, the sector is concerned with the structure and evolution of the atmosphere and the hydrosphere; fluid circulation and fluid interactions, including mass and energy changes. Physical and mathematical techniques are used, both of a theoretical and modeling nature, and of an experimental and observational nature. Experimental measurements include surface, sea, and atmospheric measurements, as well as telemetry and geodetic and topographic measurements used to assess natural hazards. The sector also oversees scientific education and geoscience education.	
Training objectives: Understand: the fundamentals of meteorology and climatology; how the climate has changed over time and how it might change in the future; the main mechanisms that caused these changes. Have a detailed knowledge of climate change and the natural and anthropogenic causes of climate change from 1850 to today.	
Prerequisites for entry: None **Prerequisites for exit:** None	

Type of exams and other tests to verify achievement:
Oral examination

Teaching: Management and conservation of the paleontological material	**Language of the teaching:** Italian
SSD: GEO/01	**CFU:** 6
Year: first/second	**Type of training activity: D –** At the student's choice

Modalities:
In-Person

Content extracted from the SSD declaratory consistent with the training objectives of the course:
The classes deal with the organisms' remains preservation mechanisms and the analysis of sedimentological environment, the techniques of recovery, conservation, management, and fruition of all the paleontological patrimony of the territory and in the museums.

Learning objectives:
The class aims at teaching the interpretation of the fossil remains by the knowledge of the main fossilization processes, at analysing some case studies of fossil sites' management and at teaching the main techniques of fossils' preparation. Students will learn the techniques of classic traditional and digital restoration of the fossil remains.

Starting prerequisites:
None

Ending prerequisites:
None

Types of examinations and other profit-checking tests:
Oral examination

Course: Optical microscopy for the study of rocks	**Teaching Language:** Italian
SSD (Subject Areas): GEO/07	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: D-** At the student's choice

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector covers the following fields of expertise: structure, composition, origin and systematics of igneous, metamorphic and sedimentary rocks; petrogenetic and geodynamic significance of petrographic associations; thermodynamic interpretation and modeling of petrogenetic processes. The above contents are essential for understanding the structure and evolution of the Earth and other planetary bodies. They also find effective expression in naturalistic museology, in the management of natural assets, in scientific education and in geoscience teaching.

Objectives:
The objective of the course is aimed at acquiring practical knowledge in the field of optical microscopy applied to the study of igneous, sedimentary and metamorphic rocks that characterize the substrate of Planet Earth on which plant and animal life develops. A further specific educational objective in the field of natural sciences is the relationship between the textures of the various rocks and the genetic environment of formation.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Impact of global changes on natural and anthropogenic plant systems	**Teaching Language:** Italian
SSD (Subject Areas): BIO/03	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity:** **D**- At the student's choice

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The course analyzes "environmental quality, nature conservation, environmental impact assessment, the floristic-vegetation aspects of environmental design and environmental education aimed at the study of ecological complexity and the compatible management and monitoring of natural resources , also in relation to global changes".

Objectives:
Study of the dynamics of environmental alteration processes of the autotrophic component of ecosystems of natural and anthropized environments in response to global changes. Definition of the conservation and sustainable use of our planet's plant resources.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Written and Oral examination

Course: Sustainability science	**Teaching Language:** Italian
SSD (Subject Areas): BIO/07	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity:** **D**- At the student's choice

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector deals with the relationships of autotrophic and heterotrophic organisms - terrestrial (including soil organisms), marine and freshwater - with their environment, with particular attention to distribution, evolutionary history, responses to the physical environment and interactions between organisms conspecific and heterospecific. The sector also takes care of the following application aspects: conservation and management of ecosystems, use of biological resources, control of exotic species, strategies for maintaining biodiversity and sustainability of the biosphere, ecotoxicology, environmental quality indicators, environmental impact assessment, aspects ecology of environmental remediation and recovery.

Objectives:
Basics of epistemology. Learning to learn fiction. Learn to interpret complex systems. Generate the capacity to connect domains: environmental, social and economic. Knowledge of different integrated approaches. Develop the ability to interact between students and teacher for participatory approaches.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Responses and adaptation of plant organisms to environmental stress and climate change	**Teaching Language:** Italian
SSD (Subject Areas): BIO/04	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity:** **D-** At the student's choice

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The course includes disciplines that describe the basic mechanisms of plant functioning and their productivity. Ecophysiology is explicitly mentioned in the SSD declaration and particularly consistent with the training objectives of the course.

Objectives:
The main objective of this course is to acquire in-depth knowledge on the resilience and adaptation capabilities of plants to climate change.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Written and Oral examination

Course: Molecular techniques in plant systematics and phylogeny	**Teaching Language:** Italian
SSD (Subject Areas): BIO/02	**CREDITS:** 6
Course year: first/second	**Type of Educational Activity:** **D-** At the student's choice

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Systematic Botany has as its object the taxonomic and biological diversity of current and fossil plants - including in this notion both prokaryotic and eukaryotic photosynthetic organisms, fungi, and their symbionts - their evolution and the affinity relationships that exist between them. Systematic Botany includes field floristic survey, the recognition and constitution of elementary taxa, the theory and classificatory techniques of diversity groups, their projection into concrete taxonomic systems, their use for biogeographical reconstructions. Tools of Systematic Botany are the acquisition, synthesis and comparative analysis of chorological, biological-reproductive, populationistic, paleobotanical, palynological, morpho-anatomical, histological, cytological, cytogenetic, phytochemical, genomic and molecular information.

Objectives:
The aim of the course is to make people understand that the study of plant systematics and related phylogeny is not a static problem and that the progress of discoveries and knowledge allows us to evaluate the richness of plant forms and their evolutionary relationships with different approaches.
The course will provide the tools to understand the study of plant systematics and phylogeny using molecular techniques, also giving the cultural basis to be able to access a molecular biology laboratory.
Completion and in-depth disciplines will be offered through the aid of audiovisual material, practical examples on selected scientific articles, comparison in the laboratory where the techniques and tools studied are applied.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:

Oral examination

ANNEX 2.2

DEGREE PROGRAM DIDACTIC REGULATIONS

NATURAL SCIENCES

CLASS LM-60

School: Polytechnic of Basic Sciences

Department: Biology

Didactic Regulations in force since the academic year 2024-25

Training Activity: English language laboratory 2 (LIN/12)	**Training Activity Language:** English	
Content of the activities consistent with the training objectives of the course: Additional linguistic knowledge	**CFU:** 4	
Course year: First/second		**Type of Training Activity: F -** Further training activities
Teaching Methods: in-person/by distance teaching		
Objectives: Acquisition of advanced notions for understanding scientific texts and articles in English. Independent use of the language for the exposition of scientific topics and technical discussions. Clear and detailed writing of your opinions in English. Strengthening and developing autonomy in English conversation.		
Propaedeuticities: None		
Types of examinations and other tests: aptitude		

Training Activity: under Art. 10, c. 5, letter d	**Training Activity Language:** Italian	
Content of the activities consistent with the training objectives of the course: Other knowledge useful for job placement; IT and telematics skills; training and orientation periods) that contribute to the achievement of the CdS objectives	**CFU:** 6	
Course year: first/second		**Type of Training Activity: F -** Further training activities

Teaching Methods:
in-person/by distance

Objectives:
Acquisition of knowledge of the complex world of work in the organic sector and consolidation of one's perception and awareness regarding the relationship between university preparation and professional activities.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
aptitude