



UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2023/24
MASTER DEGREE
BIOGEOSCIENCES: ANALYSIS OF ECOSYSTEM AND SCIENZE
COMMUNICATION - (Classe LM-60)
enrolled from 2018/2019 academic year

HEADING

Degree classification - Denomination and code:	LM-60 Nature sciences
Degree title:	Dottore Magistrale
Curricula currently available:	Ecosystem analysis, monitoring and management / Science communication, dissemination and teaching
Length of course:	2 years
Credits required for admission:	180
Total number of credits required to complete programme:	120
Years of course currently available:	1st , 2nd
Access procedures:	Open, subject to entry requirements
Course code:	F2B

PERSONS/ROLES

Head of Interdepartmental Study Programme

Prof.ssa Morena Casartelli

Degree Course Coordinator

Prof.ssa Morena Casartelli

Tutors - Faculty

Tutor orientamento e piani di studio:

Curriculum ANALISI, MONITORAGGIO E GESTIONE DEGLI ECOSISTEMI

Cristina Bonza, Roberta Pennati, Marco Caccianiga, Maria Rose Petrizzo

Curriculum COMUNICAZIONE, DIVULGAZIONE E METODOLOGIE DIDATTICHE DELLE SCIENZE

Manuela Pelfini, Alessandra Moscatelli, Paolo Tremolada

Tutor per la mobilità internazionale e l'Erasmus - Silvia Caccia

Tutor per stage e tirocini - Alessandra Moscatelli

Tutor per trasferimenti - Cristina Bonza

Tutor per riconoscimento crediti - Cristina Bonza

Tutor per ammissione magistrale - Cristina Bonza

Degree Course website

<https://biogeosienze.cdl.unimi.it/it>

via Celoria 18 Email: morena.casartelli@unimi.it

Course management

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Libraries

<https://www.unimi.it/it/studiare/biblioteche>

Student registrar

via Celoria 18 Phone 0250325032 <https://www.unimi.it/it/node/360> <https://www.unimi.it/it/node/359>

CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

In line with the qualifying learning objectives of the corresponding degree class, the Master's degree programme in Biogeosciences: Analysis of Ecosystem and Science Communication aims to provide an in-depth, interdisciplinary and multidisciplinary knowledge of the structural and functional components of ecosystems in the current and past natural environment, also in relation to the human presence, to outline the conceptual tools for the conservation, protection and management of the environment, as well as to provide knowledge and methodologies for the dissemination, communication and teaching of natural sciences.

The programme is addressed to students who want to extend and deepen their knowledge in the field of natural sciences, maintaining the traditional balance between abiotic and biotic factors, in order to gain an organic and synthetic understanding of nature and its issues. The degree programme also has a specific curriculum aimed at providing students with a solid and wide-ranging knowledge base that will enable them to work in the areas of training, communication and teaching. The programme is especially designed with the following objectives:

- Provide a solid knowledge base to study the structure and functioning of ecosystems from a spatial as well as diachronic perspective, with an approach based on interdisciplinary and multidisciplinary integration;
- Prepare graduates that are able to analyse biodiversity at multiple levels, from genetic diversity to specific and environmental diversity, and to study the geological components of natural environments, as well as the role they play in the functioning of ecosystems and the services such ecosystems provide;
- Prepare graduates that are able to address environmental issues with a rigorous scientific approach and to work with a high degree of autonomy, taking on responsibilities for projects and organisational units, even in a managerial and directive capacity;
- Provide tools for the communication and dissemination of natural sciences;
- Prepare graduates in terms of subject matter contents, methodologies and technologies required to teach in upper secondary schools;

The degree programme encompasses educational activities in the fields of: a) mathematics/statistics, informatics, chemistry and physics, to provide advanced knowledge and skills instrumental to the analysis and monitoring of ecosystems and the teaching of sciences; b) agriculture, management and communication, to build up a solid knowledge base regarding environmental law and management and provide students with an understanding of communication methodologies and the psycho-pedagogical and sociological aspects of teaching; c) biology, ecology and geology, to cover various aspects of life sciences (biosciences) and earth sciences (geosciences) with a highly integrated approach. All of this will enable students to deepen their background knowledge and become highly skilled in the analysis and monitoring of ecosystems, as well as to master the fundamental skills, methodologies and technologies required to disseminate and teach natural sciences. Moreover, the programme includes several additional activities to integrate knowledge in other related domains, and requires students to demonstrate oral and written proficiency in English.

Expected learning outcomes

Expected learning outcomes

A. The Master's degree programme in Biogeosciences: analysis of ecosystem and science communication provides students with:

- in-depth knowledge and understanding of disciplines concerning biotic and abiotic components of ecosystems, as well as their conservation and enhancement, and land management techniques;
- in-depth scientific knowledge of the most important processes that have an impact on the quality of the environment and on the conservation of biodiversity and geodiversity;
- an understanding of the interdisciplinary characteristics of environmental and natural studies and the ability to situate the problems of naturalistic research in their historical and evolutionary context;
- in-depth knowledge of IT tools for the acquisition and analysis of geographic and georeferenced naturalistic data, e.g. geographic information system (GIS) and related databases;
- knowledge of methodologies and technologies to operate in the fields of scientific dissemination and communication of natural sciences and education at secondary school;
- knowledge of psycho-pedagogical, anthropological and sociological aspects of teaching sciences.

Knowledge and understanding are achieved through the student's participation in lectures and exercises and independent study in the frame of the core courses. Specific training is provided by the wide range of supplementary courses.

The acquisition of such knowledge and understanding is assessed by way of activities carried out by the student during the relevant teaching period (e.g. papers, problems and exercises, oral presentations in the class), as well as during oral and/or written exams in the frame of each course.

B. The Master's degree programme in Biogeosciences: analysis of ecosystem and science communication provides students with the ability to apply knowledge and understanding, as follows:

- ability to independently use the most important experimental methods in natural sciences, and to describe, analyse and critically evaluate data collected in the laboratory and/or on the field;
- ability to apply knowledge about the components of ecosystems and their interactions, monitoring procedures and land management practices;

- ability to organise naturalistic data for dissemination and communication;
- ability to disseminate the core concepts of natural sciences to the public and to students in various school settings;
- ability to proficiently communicate in English in a scientific, teaching or dissemination context.

Students learn to apply knowledge and understanding by attending course lectures. The ability to apply knowledge and understanding is assessed by way of oral and/or written exams aimed at testing the student's mastery of tools, methods and their applications. Moreover, the ability to apply knowledge and understanding is verified by assessing how the student has worked on his/her final thesis.

C. The Master's degree programme in Biogeosciences: analysis of ecosystem and science communication provides students with the ability to make judgements concerning:

- the choice of a customised academic pathway;
- the use of appropriate techniques and methods for the analysis of biotic and abiotic components of ecosystems;
- the evaluation of social and ethical implications when planning interventions on the natural environment;
- the use of the most appropriate register to disseminate knowledge on nature and the most suitable methodological and technological approaches for teaching sciences.

The ability to make judgements and to plan and conduct analyses and experiments will be enhanced through essay preparation and the participation in study groups and seminars organised in the frame of each course. Students' ability to make judgements is assessed in different circumstances, e.g. in the frame of critical discussions during exams, by assessing their team-working skills, and by evaluating how they conducted the experimental work for their final thesis and approached the writing process.

D. The Master's degree programme in Biogeosciences: analysis of ecosystem and science communication provides students with the following communication skills:

- ability to communicate orally and in writing to both experts in the field and the general public, using an appropriate language and register according to the different circumstances;
- ability to use new communication technologies;
- proficiency in a second European language besides the student's mother-tongue, with a focus on the terminology of natural sciences.

Students acquire written and oral communication skills by taking part in exams, seminars, exercises and training activities that require the preparation and presentation of reports, also using multimedia tools.

Communication skills are assessed by way of exams, as well as on the basis of the student's final thesis and presentation thereof.

E. The Master's degree programme in Biogeosciences: analysis of ecosystem and science communication provides students with the following learning skills:

- ability to use continuous professional development resources in the fields of science, and to access scientific literature produced in at least one European language besides the students' mother-tongue;
- ability to understand the multidisciplinary and interdisciplinary aspects of natural sciences in order to adopt different approaches to the study of nature and assess their efficacy;
- ability to understand the scientific method and apply it to research in the field of natural sciences;
- awareness of the importance of using new communication technologies (e-learning platforms).

Learning skills are acquired throughout the academic pathway as a whole and during the activities for the preparation of the final thesis; they are assessed by way of independent reports submitted by students, as well as during the final exam.

Professional profile and employment opportunities

Career opportunities for master's degree in BioGeosciences: Analysis of ecosystems and Science communication can be found in the public sector and in the private sector.

In addition, the degree allows access to PhDs and II level masters.

Graduates in curriculum Ecosystem analysis, monitoring and management will be able to perform monitoring of biotic naturalistic components (flora and fauna with particular reference to species indicated in the EU directives and to the alien species, habitats of community interest) and abiotic (rocks, geological structures, landscape forms with particular reference to the enhancement and geoconservation) on behalf of institutions responsible for the management of the territory and the natural heritage (regions, municipalities, other public and private agencies, parks and reserves) and as freelance. Professional profile: Expert in the research, analysis and management of natural systems.

Graduates in curriculum Science communication, dissemination and teaching will be able to perform activities for the dissemination of knowledge of the natural ecosystems of the present and of the geological past; environmental education activities in schools and institutions, parks and organizations; preparation of exhibitions on nature and environment; awareness-raising activities on sustainable development. Furthermore, the degree course provides adequate preparation for teaching scientific disciplines and the suitable background to participate in the competition for access to the role of teacher of secondary school, according to current legislation. Professional profile: Expert in the dissemination of natural sciences.

The course, after passing a specific state exam allows to enroll in the professional registers of graduate agro-technician and graduate agricultural expert.

Initial knowledge required

Requirements and knowledge required for admission

The curricular requirements for admission to the Master's degree course in BioGeosciences: Analysis of Ecosystems and Communication of Sciences are fully satisfied by graduates of the degree class in Sciences and Technologies for the Environment and Nature (L-32) and of the corresponding class relating to Ministerial Decree 509/99. Graduates with a degree from another class, as well as those holding another qualification obtained abroad and recognised as suitable are also eligible for admission to the Master's degree course, providing they can demonstrate that they meet the curricular requirements and the adequacy of their personal preparation necessary to successfully pursue their studies, as specified below.

Students with a degree obtained abroad will be assessed by the Admission Committee for the Master's degree on the basis of their curriculum (type of bachelor degree, bachelor study programme) and through an interview (also online) aimed at verifying whether they meet the specific curricular requirements and the adequacy of their personal preparation for admission to the Master's degree. The date of the interview is the one indicated in the Manifesto degli Studi for all other students.

For students who have obtained a Bachelor's degree in Italy in classes other than L-32, the curricular requirements for access to the Master's degree imply having acquired at least:

- 6 CFU in mathematical disciplines (MAT/01 Mathematical Logic, MAT/02 Algebra, MAT/03 Geometry, MAT/04 Complementary Mathematics, MAT/05 Mathematical Analysis, MAT/06 Probability and Mathematical Statistics, MAT/07 Mathematical Physics, MAT/08 Numerical Analysis),

- 6 CFU in physics (FIS/01 Experimental physics, FIS/02 Theoretical physics, mathematical models and methods, FIS/03 Physics of matter, FIS/04 Nuclear and subnuclear physics, FIS/05 Astronomy and astrophysics, FIS/06 Physics for the Earth system and the circum-terrestrial medium, FIS/07 Applied physics (cultural heritage, environmental, biology and medicine), FIS/08 Physics education and history),

- 6 CFU in chemical disciplines (CHIM/01 Analytical chemistry, CHIM/02 Physical chemistry, CHIM/03 General and inorganic chemistry, CHIM/06 Organic chemistry),

and having acquired at least 60 CFU in the following characterising disciplines of class L-32:

- Agricultural disciplines (AGR/01 Rural economics and valuation, AGR/02 Agronomy and herbaceous cultivation, AGR/03 General arboriculture and tree cultivation, AGR/04 Horticulture and floriculture, AGR/05 Forest management and silviculture, AGR/06 Wood technology and forestry, AGR/07 Agricultural genetics, AGR/08 Agricultural hydraulics and hydraulic-forestry systems, AGR/10 Rural construction and agroforestry, AGR/11 General and applied entomology, AGR/12 Plant pathology, AGR/13 Agricultural chemistry, AGR/14 Pedology, AGR/16 Agricultural microbiology, AGR/19 Special zootechnics, AGR/20 Zoocultures),

- biological disciplines (BIO/01 General botany, BIO/02 Systematic botany, BIO/04 Plant physiology, BIO/05 Zoology, BIO/06 Comparative anatomy and cytology, BIO/08 Anthropology, BIO/10 Biochemistry, BIO/11 Molecular biology, BIO/16 Human anatomy, BIO/18 Genetics, BIO/19 Microbiology)

- ecological disciplines (BIO/03 Environmental and applied botany, BIO/07 Ecology, GEO/04 Physical geography and geomorphology),

- Earth science disciplines (GEO/01 Palaeontology and palaeoecology, GEO/02 Stratigraphic and sedimentary geology, GEO/03 Structural geology, GEO/05 Applied geology, GEO/06 Mineralogy, GEO/07 Petrology and petrography, GEO/08 Geochemistry and volcanology, GEO/09 Mineral resources and mineralogical-petrographic applications for the environment and cultural heritage, GEO/10 Solid Earth Geophysics, GEO/11 Applied Geophysics, GEO/12 Oceanography and Atmospheric Physics).

Of these 60 CFU, the student must have acquired at least 6 CFU in biological disciplines, 6 CFU in ecological disciplines and 6 CFU in Earth Sciences disciplines.

Application for admission

Application period: 06/03/2023-25/08/2023.

The personal preparation of all candidates will be verified through an interview carried out by a commission of lecturers designated by the Interdepartmental Teaching Board. The commission will assess any shortcomings in the candidates' subject areas. The interview may also take place before the three-year degree - to be completed by 31 December 2023 for matriculation purposes.

The knowledge required for admission to the Master's degree course includes an adequate basic training in the biological (general biology and histology, zoology and botany), geological (geology, palaeontology, mineralogy, petrography, geomorphology) and ecological fields in order to be able to cope with the advanced level of studies (Syllabus published on <https://biogeoscienze.cdl.unimi.it/it/avvisi>).

During the admission interview, the following will be assessed: 1) the adequacy of the previous curriculum of studies; 2) the candidate's individual preparation.

A negative result in the interview will mean that all students, graduates and undergraduates, will be excluded from admission to the Master's degree course for the current year.

For the academic year 2023/2024, the date for the interview will be 19 September 2023 at 9.30 a.m. (for arrangements - in person or remotely - please check the notices page at <https://biogeoscienze.cdl.unimi.it/it>). Sessions, including individual ones, may be scheduled for those who register before summer 2023. It is in all cases necessary to check the level of English language knowledge within the indicated dates.

Candidates must present themselves with a valid identity document on the date and time indicated.

Students from the University who have applied for admission and who have acquired CFUs in excess of the required 180 during their Bachelor's degree course, by attending courses and/or laboratories included in the Master's degree course, may request their recognition in order to obtain the required 120 CFUs.

IMPORTANT: At the time of the admission interview, students must have already chosen their Curriculum. The choice must be made official at the time of enrolment.

Proficiency in English at a B1 level or higher under the Common European Framework of Reference for Languages (CEFR) is required for admission.

The B1-level requirement will be ascertained by the University Language Centre (SLAM) upon admission as follows:

- Language certificate at or above B1, obtained no more than three years earlier. For the list of language certificates recognized by the University please review: <https://www.unimi.it/en/node/39267/>). The certificate must be uploaded when submitting the online application;
- English level achieved during a University of Milan degree programme and certified by the University Language Centre (SLAM) no more than four years before the date of admission application. In this case the process is automatic, the applicant does not have to attach any certificates to the application;
- Placement test administrated by the University Language Centre (SLAM) according to the calendar published on the website: <https://www.unimi.it/en/node/39267/>

All those who fail to submit a valid certificate or do not meet the required proficiency level will be instructed during the admission procedure to take the placement test.

Applicants who do not take or pass the placement test will be required to obtain a language proficiency certificate recognized by the University (see: <https://www.unimi.it/en/node/297/>) and deliver it to the SLAM via the InformaStudenti service by the deadline fixed for the master's programme (<https://www.unimi.it/en/node/39267/>).

Applicants who do not meet the requirement by said deadline will not be admitted to the master's degree programme and may not sit any further tests.

Compulsory attendance

Attendance to didactic activities including laboratories, field activities, internships which provide credits, is compulsory.

Degree programme final exams

The Master's degree in BioGeosciences: Analysis of Ecosystems and Communication of Sciences is completed after passing a final exam, which consists of the presentation of a thesis written in an original form by the student, under the guidance of a tutor, reporting the results of personal research in line with the guided path followed by the student within one of the two proposed curricula. To be admitted to the final exam, which implies the acquisition of 33 or 39 credits depending on the chosen curriculum, the student must have obtained 87 or 81 credits respectively.

The final exam may be taken in English, as well as the drafting of the relative paper.

The committee consists of at least five and no more than eleven members. The grade is expressed in 110ths and is based on the calculated average of the marks for the examinations of the individual subjects in the study plan, plus a maximum of 9 points for the thesis and a maximum of 1 point for the career (additional credits, career speed, field activities, international mobility programmes). The total number of points to be added to the average should not exceed a maximum of 10 (9 + 1). The points for the thesis are distributed as follows: 3-4 poor; 5-6 sufficient; 7 good; 8 excellent; 9 excellent on the basis of the quality of the thesis, the ability to present the results and to answer the committee's questions and on the basis of the judgement expressed by the co-examiner and the tutor.

<https://www.unimi.it/it/studiare/frequentare-un-corso-di-laurea/laurearsi>

Campus

Course locations: Department of Biosciences (via Celoria 26), Settore Didattico (via Celoria 20, via Golgi 19, via Venezian 14), Department of Earth Sciences "Ardito Desio" (via Mangiagalli 34 e via Botticelli 23) and other departments/buildings located in Milan-Città Studi.

Notes

In order to obtain their degree, students must be proficient in English at a B2 level, certified as follows:

via a B2 or higher level language certificate issued no more than three years prior to the date of application. You will find the list of language certificates recognized by the University at: <https://www.unimi.it/en/node/39267/>). If not submitted during the application process, the certificate must be uploaded when enrolling, or subsequently at: <http://studente.unimi.it/uploadCertificazioniLingue>;

B2 or higher level achieved earlier and validated during the application process;

B2 or higher level achieved during the admission test;

via the placement test administrated by the University Language Centre (SLAM) between October and January of year 1.

All those who do not achieve B2 or higher level will be required to attend a B2-level English course administrated by the University Language Centre (SLAM) during the second semester of year 1.

Those who do not attend the course or do not pass the end-of-course exam after six attempts must obtain the necessary certification privately before graduating.

Experience of study abroad as part of the training programme

The University of Milan supports international mobility by providing its students with the opportunity to spend study and internship periods abroad. It is a unique chance to enrich your educational path in a new exciting environment.

The agreements entered into by the University with over 300 universities from the 27 EU member countries under the European Erasmus+ programme allow regularly enrolled students to carry out part of their studies at one of the partner universities or to undertake internships at companies, training and research centres and other organizations.

Similar international mobility opportunities are provided outside Europe, through agreements with a number of prestigious institutions.

Study and internships abroad

As part of the ERASMUS + program, for students enrolled in the Master Degree agreements with Danish, Spanish, French, Swiss and Romanian universities have been concluded. During the study period abroad, the students can attend courses and take exams, and carry out researches for the thesis. Students in the mobility program must submit a study plan proposal that includes the training activities they plan to carry out abroad. As far as possible, the number of CFU of the proposed study plan must correspond to what the student would acquire in an equivalent period of time at his university. The proposed activities, selected among the host university's educational activities, must be consistent with the educational project of the Master Degree course. The study plan must be submitted for approval to the Erasmus Commission of the Collegio Didattico Interdipartimentale. The Commission may ask the student to integrate the program of an exam taken in the host university with an interview to be carried out in the University of Milano on an agreed supplementary program. At the end of the mobility program, in compliance with the University guidelines, the exams passed will be recorded in the student's career with the original name of the course in the host foreign university, and their ECTS converted into CFU and the vote expressed in thirtieths.

How to participate in Erasmus mobility programs

How to participate in Erasmus+ mobility programmes

The students of the University of Milan can participate in mobility programmes, through a public selection procedure.

Ad hoc commissions will evaluate:

Academic career

the candidate's proposed study programme abroad

his/her foreign language proficiency

the reasons behind his/her application

Call for applications and informative meetings

The public selection for Erasmus+ mobility for study generally begins around February each year with the publication of a call for applications specifying destinations and requirements. Regarding the Erasmus+ Mobility for Traineeship, the University of Milan usually publishes two calls a year enabling students to choose a destination defined by an inter-institutional agreement or to find a traineeship position on their own.

The University organizes informative meetings to illustrate mobility opportunities and rules for participation.

Erasmus+ scholarship

The European Union grants the winners of the Erasmus+ programme selection a scholarship to contribute to their mobility costs, which may be supplemented by the University funding for disadvantaged students.

Language courses

Students who pass the selections for mobility programmes can benefit from intensive foreign language courses offered each year by the University Language Centre (SLAM).

<https://www.unimi.it/en/node/8/>

Learn more at <https://www.unimi.it/en/node/274/>

For assistance, please contact:

International Mobility Office

Via Santa Sofia 9 (second floor)

Tel. 02 503 13501-12589-13495-13502

Contacts: InformaStudenti; mobility.out@unimi.it

Student Desk booking through InformaStudenti

1st COURSE YEAR Core/compulsory courses/activities common to all curricula		
Learning activity	Ects	Sector
English proficiency B2 (3 ECTS)	3	ND
Total compulsory credits		3

ACTIVE CURRICULA LIST

Ecosystem analysis, monitoring and management Course years currently available: 1st , 2nd

Science communication, dissemination and teaching Course years currently available: 1st , 2nd

Procedure for choosing a curriculum

The selection of the curriculum will be performed at the inscription.

Qualifying Training Objectives

Qualifying learning objectives

The curriculum ECOSYSTEM ANALYSIS, MONITORING AND MANAGEMENT aims to provide an in-depth, interdisciplinary and multidisciplinary knowledge of the structural and functional components of ecosystems in the current and past natural environment, also in relation to the human presence, and to outline the theoretical tools for the conservation, protection and management of the environment. The programme is addressed to students who want to extend and deepen their knowledge in the field of natural sciences, maintaining the traditional balance between abiotic and biotic factors, in order to gain an organic and comprehensive understanding of nature and its issues.

Skills acquired

Expected learning outcomes

A

- In-depth knowledge and understanding of the disciplines concerning biotic and abiotic components of ecosystems, as well as their conservation and enhancement, and land management techniques;
- Scientific knowledge of the most important processes that have an impact on the quality of the environment and the conservation of biodiversity and geodiversity;
- In-depth knowledge of IT tools for the acquisition and analysis of geographic data and georeferenced naturalistic data, e.g. geographic information system (GIS) and related databases;

B

- Ability to independently use the most important experimental methods and to describe, analyse and critically evaluate data collected in the laboratory and/or in the field.
- Ability to apply knowledge of the components of ecosystems and their interactions, monitoring procedures and land management practices.

C

- Ability to choose appropriate techniques for the analysis of components of natural and man-made environments;
- Ability to assess social and ethical implications when planning interventions on the natural environment.

D

- Ability to communicate orally and in writing to a public of experts using an appropriate language;
- Ability to use new communication technologies;
- Proficiency in a second European language.

E

- Ability to use continuous professional development resources, and to access scientific literature produced in at least one European language besides the student's mother-tongue;
- Ability to understand the multidisciplinary and interdisciplinary aspects of natural sciences in order to adopt different approaches to the study of nature, and assess their efficacy;
- Ability to understand the scientific method and apply it to research in the field of natural sciences;
- Awareness of the importance of using new communication technologies (e-learning platforms).

Professional profile and employment possibilities

Professional profile and employment opportunities

Graduates will be able to identify and monitor biotic naturalistic components (flora and fauna with particular reference to species indicated in the EU directives and alien species, habitats of Community interest) as well as abiotic components (rocks, geological structures, landscape forms with particular reference to enhancement and geo-conservation), working for institutions responsible for the management of the territory and natural heritage (regions, municipalities and other public and private entities, parks and reserves), or as freelancers.

Career opportunities can be found in the public sector: schools, universities, research bodies (e.g. National Research Council - CNR; Italian National Agency for New Technologies, Energy and Sustainable Economic Development - ENEA), environmental management companies and environmental service providers, Ministries, the Italian Institute for Environmental Protection and Research (ISPRA), Regional Agencies for the Protection of the Environment (ARPA), Higher Institute of Health (Istituto Superiore di Sanità), Experimental Stations, Archaeological Superintendences. Graduates may also work in the private sector, carrying out their activities in different types of companies and in the increasing number of consultancy agencies and cooperatives that promote a more sustainable fruition of the territory. In addition, graduates of this Master's degree possess the skills to work in Public Administration offices (Regions, Provinces, Municipalities, Mountain Communities), environmental associations, foundations that operate in the management of environmental issues, and in scientific publishing.

Relevant professional profiles Expert in the research, analysis and management of natural systems

Learning activity		Ects	Sector
Methods in Ecosystem analysis		12	GEO/04, BIO/07, BIO/03
Total compulsory credits		12	
Further elective courses Curriculum-specific features Ecosystem analysis, monitoring and management			
GUIDED PATH COURSES			
the student must choose 42 cfu for a total of 7 courses in accordance with the five rules listed:			
1- The student must compulsorily choose 1 or 2 of the following courses (chemical, physical, mathematical and IT disciplines)			
Astronomy		6	FIS/05
Environmental chemistry		6	CHIM/12
Geographic Information Systems and Environmental Modelling		6	INF/01
2- The student must compulsorily choose 1 or 2 of the following courses (agricultural, management and communication disciplines):			
Environmental economics and policy		6	AGR/01
Environmental Ethic		6	AGR/01
Population Biology and Genetics		6	AGR/07
3- The student may choose 1 of the following courses (ecological disciplines):			
Alpine Glaciology and Climatology		6	GEO/04
Applied geomorphology		6	GEO/04
Geomorphological heritage and geodiversity		6	GEO/04
Plant ecology		6	BIO/03
Quantitative ecology		6	BIO/07
4- The student must compulsorily choose 2 or 3 of the following courses (Earth Science disciplines):			
Applied palaeoecology		6	GEO/01
Biominalization		6	GEO/01
Environmental Geochemistry		6	GEO/08
Gemology		6	GEO/06, GEO/09
Geological evolution of a habitable planet		6	GEO/02
Geology of the Mediterranean area		6	GEO/03, GEO/07
Stratigraphic Paleontology		6	GEO/01
Vertebrate paleontology		6	GEO/01
5- The student must compulsorily choose 2 or 3 of the following courses (biological disciplines):			
Adaptation of animals and plants to environment		6	BIO/09, BIO/04
Anatomy and physiology of the integrated systems		6	BIO/09, BIO/06
Animal behaviour		6	BIO/05
Biogeography		6	BIO/05, BIO/02
Biological interactions and social behaviour in insects		6	BIO/05
Laboratory methods for biodiversity		6	BIO/06, BIO/05, BIO/01
Palynology		6	BIO/02
Phylogeny and evolution		6	BIO/05
Wildlife management		6	BIO/05
RELATED AND SUPPLEMENTARY COURSES			
The student must compulsorily choose 2 of the following courses:			
Anthropology		6	BIO/08
Control strategies for insect pests and vectors		6	VET/06, AGR/11
Forensic sciences		6	MED/43
Geophysics for natural risks		6	GEO/12, GEO/11
Mathematical Modeling		6	MAT/07
Micropedology Laboratory		6	AGR/14
Principles And Dynamics of the "Critical Zone"		6	AGR/14
Symbiosis and parasitism		6	VET/06
FREE-CHOICE COURSES			
The student must autonomously acquire 12 CFUs from all the courses offered by the University (preferably chosen within the scientific area), as long as they are in line with the training project, subject to assessment by his/her tutor. In particular, the student may choose from all the optional courses in this manifesto unless previously chosen in the other rules.			
End of course requirements Curriculum-specific features Ecosystem analysis, monitoring and management			
Final exam		39	ND
Total compulsory credits		39	

CURRICULUM: [F2B-B] Science communication, dissemination and teaching

Qualifying Training Objectives

Qualifying learning objectives

The Curriculum SCIENCE COMMUNICATION, DISSEMINATION AND TEACHING aims to provide students with knowledge and methodologies for the dissemination, communication and teaching of natural sciences. This curriculum is designed for students interested in working in the fields of education, communication and teaching of natural sciences.

Skills acquired

Expected learning outcomes

A

- In-depth knowledge and understanding of the biotic and abiotic components of ecosystems;
- Understanding of the interdisciplinary aspects of environmental and natural studies and of the historical and evolutionary context;
- Knowledge of methodologies and technologies to operate in the fields of scientific dissemination and communication of natural sciences, and to teach natural sciences in secondary schools;
- Knowledge of the psycho-pedagogical, anthropological and sociological aspects of teaching sciences.

B

- Ability to organise naturalistic data for dissemination and communication;
- Ability to disseminate the core concepts of natural sciences to the public and to students in various school settings;
- Ability to set out assessment processes in teaching;
- Proficiency in the use of the English language in a scientific, teaching or dissemination context.

C

- Ability to choose the most appropriate register to disseminate knowledge on nature and the most suitable methodological and technological approaches for teaching purposes.

D

- Ability to communicate orally and in writing to both experts in the field and the general public, using the appropriate language register according to the different circumstances.
- Ability to use new communication technologies;
- Proficiency in a second European language besides the student's mother-tongue, with a focus on the terminology of natural sciences.

E

- Ability to use continuous professional development resources, and to access scientific literature produced in at least one European language besides the student's mother-tongue;
- Ability to develop communication and dissemination skills;
- Awareness of the importance of using new communication technologies (e-learning platforms).

Professional profile and employment possibilities

Professional profile and employment opportunities

Graduates will be able to: disseminate knowledge regarding current ecosystems and ecosystems of the geological past; promote environmental education activities in schools, institutions, parks and organisations, set up exhibitions on nature; implement awareness-raising activities on sustainable development.

This curriculum enables students to meet the requirements to participate in the competition for access to the role of secondary school teacher, in the following classes: A-31 (ex A057) - Food sciences, A-32 (ex A011 and A054) - Geology and mineralogy sciences, A-50 (ex A060) - Natural, chemical and biological sciences. Furthermore, it allows students of the Bachelor's degree in Natural Sciences of the University of Milan to fully meet the requirements for the A-28 class (ex A059) - Mathematics and science for lower-secondary school (attachment A of DM-259-17). Finally, the study plan of this curriculum allows for the acquisition of the 24 credits (ECTS/CFUs) regarding anthropological and psycho-pedagogical disciplines and teaching methodologies and technologies, which are required for all classes by the current legislation.

Career opportunities can be found in the public sector: schools, universities, research bodies, environmental management companies and environmental service providers, Ministries, the Italian Institute for Environmental Protection and Research, Regional Agencies for the Protection of the Environment, Higher Institute of Health (Istituto Superiore di Sanità), Archaeological Superintendences. Graduates may also work in the private sector, mostly in the area of science dissemination and communication, carrying out their activities in different types of companies and in consultancy agencies and cooperatives that promote a more sustainable fruition of the territory. Graduates possess the skills to work in Public Administration offices (Regions, Provinces, Municipalities, Mountain Communities), environmental associations, foundations that operate in the management of environmental issues, and in scientific and educational publishing.

Relevant professional profiles Expert in the dissemination of natural sciences

1st COURSE YEAR Core/compulsory courses/activities Curriculum-specific features Science communication, dissemination and teaching		
Learning activity	Ects	Sector
Teaching methodologies and techniques for biogeosciences	12	(6) GEO/04, (6) BIO/07
Total compulsory credits	12	
Further elective courses Curriculum-specific features Science communication, dissemination and teaching		
GUIDED PATH COURSES:		
the student must choose 42 cfu for a total of 7 courses in accordance with the five rules listed:		

1- The student must compulsorily choose 1 or 2 of the following courses (chemical, physical, mathematical and computer science disciplines):		
Astronomy	6	FIS/05
Communication and teaching of Mathematics	6	MAT/04
Geographic Information Systems and Environmental Modelling	6	INF/01
Geometry in natural and anthropic environments and its teaching	6	MAT/03, MAT/04
2- The student must compulsorily choose 1 or 2 of the following courses (agricultural, management and communication disciplines):		
Cultural tools for the dissemination of BioGeosciences	6	SPS/08
Environmental economics and policy	6	AGR/01
Environmental Ethic	6	AGR/01
Fundamentals of psychology	6	M-PSI/01
General pedagogy	6	M-PED/01
Methods of communication	6	SPS/08
3- The student may choose 1 of the following courses (ecological disciplines):		
Applied geomorphology	6	GEO/04
Geomorphological heritage and geodiversity	6	GEO/04
Plant ecology	6	BIO/03
4- The student must compulsorily choose 2 or 3 of the following courses (Earth Science disciplines):		
Geological evolution of a habitable planet	6	GEO/02
Geology of the Mediterranean area	6	GEO/03, GEO/07
Stratigraphic Paleontology	6	GEO/01
Vertebrate paleontology	6	GEO/01
5- The student must compulsorily choose 2 or 3 of the following courses (biological disciplines):		
Anatomy and physiology of the integrated systems	6	BIO/09, BIO/06
Biogeography	6	BIO/05, BIO/02
Cell biology	6	BIO/06, BIO/16, BIO/01
Human Anatomy	6	BIO/16
Phylogeny and evolution	6	BIO/05
RELATED AND SUPPLEMENTARY TEACHINGS		
The student must compulsorily choose 2 of the following courses:		
Anthropology	6	BIO/08
Communication, dissemination and teaching of natural sciences	6	M-PED/03
Elementary Mathematics Teaching Workshop	6	MAT/04
History and teaching of Physics	6	FIS/08
Mathematical Modeling	6	MAT/07
Social anthropology	6	M-DEA/01
Symbiosis and parasitism	6	VET/06
Urban and regional geography	6	M-GGR/01
FREE-CHOICE COURSES		
The student must autonomously acquire 18 CFUs from all the courses offered by the University (preferably chosen within the scientific area), as long as they are in line with the training project, subject to assessment by his/her tutor. In particular, the student may choose from all the optional courses in this manifesto unless previously chosen in the other rules.		
For students in the Ecosystem Analysis, Monitoring and Management curriculum and other degree programmes, the following courses are activated:		
Teaching methodologies and techniques for biosciences	6	BIO/07
Teaching methodologies and techniques for geosciences	6	GEO/04
<i>End of course requirements Curriculum-specific features Science communication, dissemination and teaching</i>		
Final exam	33	ND
	Total compulsory credits	33