



UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2020/21
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 completion of self-assessment test prior to enrolment
Course code:	F2B

PERSONS/ROLES

Head of Interdepartmental Study Programme

Prof.ssa Lucia Angiolini

Degree Course Coordinator

Prof.ssa Lucia Angiolini

Tutors - Faculty

Tutor orientamento e piani di studio:

Curriculum ANALISI, MONITORAGGIO E GESTIONE DEGLI ECOSISTEMI

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

Curriculum COMUNICAZIONE, DIVULGAZIONE E METODOLOGIE DIDATTICHE DELLE SCIENZE

Manuela Pelfini, Alessandra Moscatelli, Morena Casartelli, Paolo Tremolada

Tutor per la mobilità internazionale e l'Erasmus - Morena Casartelli

Tutor per stage e tirocini - Alessandra Moscatelli

Tutor per trasferimenti - Morena Casartelli

Tutor per riconoscimento crediti - Cristina Bonza

Tutor per ammissione magistrale - Cristina Bonza

Degree Course website

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

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

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CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

The master's degree course in BioGeosciences: Analysis of ecosystems and Science communication aims to provide an in-depth, interdisciplinary and multidisciplinary knowledge of the structural and functional components of ecosystems in the present - also in relation to the anthropic presence - and in the geological past. It is aimed to show the conceptual tools for environmental conservation, defense and management, to provide knowledge and methodologies for the dissemination, communication and teaching of Natural Sciences. The course is addressed to students who want to extend and deepen their culture in the field of nature and environment, maintaining the traditional balance between abiotic and biotic factors, to

obtain an organic and synthetic vision of nature and environment. The master's degree course addressed to students who intend to work in the field of training, communication and teaching of Natural Sciences.

Expected learning outcomes

Expected outcomes

- A.
- In-depth knowledge and understanding of the biotic and abiotic components of ecosystems, their conservation and enhancement, and land management.
 - In-depth knowledge of the most important processes that control the quality of the environment and the conservation of biodiversity and geodiversity.
 - Understanding of the interdisciplinary aspects of the studies on environment.
 - In-depth knowledge of IT tools useful for the acquisition and analysis of geographic data and georeferenced naturalistic data.
 - Knowledge of methodologies and technologies to operate in scientific dissemination and communication.
 - Knowledge of the psycho-pedagogical and anthropological-sociological aspects of scientific teaching.
- The knowledge and comprehension skills are achieved through participation in lectures and exercises and personal study.

- B.
- Ability to independently use the most important experimental methods in Natural Sciences and to describe, analyze and critically evaluate the data collected in the laboratory and/or in the field.
 - Ability to apply knowledge about the components of the ecosystems and their interactions, monitoring procedures and land management practices.
 - Ability to organize naturalistic data for dissemination and communication.
 - Ability to effectively use the English language in science, education and teaching.

The achievement of the ability to apply the knowledge listed above takes place through participation in the lessons of the courses.

- C.
- Ability to choose the appropriate techniques for the analysis of biotic and abiotic components of ecosystems.
 - Ability to evaluate in detail the social and ethical implications in the planning of interventions on the natural environment.
 - Ability to evaluate how to disseminate knowledge on nature and environment

The autonomy of judgment and the ability to plan and perform analyses and experiments are developed during the preparation of papers and the participation in study groups and seminars.

- D.
- Ability to communicate orally and in writing to a public of experts and to a non-specialist public with language properties.
 - Ability to use the new communication technologies.
 - In-depth knowledge of a second European language.

Written and oral communication skills are developed during exams, seminars, exercises and training activities that require the preparation of reports or documents and their presentation.

- E.
- Ability to use scientific updating tools and to access scientific literature produced in at least one European language.

Capacity to understand the multidisciplinary and interdisciplinary aspects of the Natural Sciences.

- Ability to develop skills to perform research, acquired through training activities and the elaboration of the thesis.
- Ability to use the new communication technologies tools (e-learning platforms).

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.

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.

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

Notes

To obtain the degree, students are required to demonstrate an English language proficiency at level B2 within the Common European Framework of Reference for Languages (CEFR). This level can be assessed in the following ways:

- by submitting the language certificate achieved no more than three years prior to the submission, at level B2 or higher,

recognised by the University (the list of recognised language certificates can be found at <https://www.unimi.it/en/node/297/>). The language certificate must be uploaded during the admission process;

- by taking the Placement Test, organised by SLAM exclusively during the first year, from October to January. Students who fail to reach level B2 will have to attend an English course organised by SLAM. The Placement Test is compulsory for all students who do not have a valid language certificate.

Students who do not take the Placement Test within the deadline and students who fail the SLAM end-of-course test within six attempts will have to obtain a language certificate within the year in which the language exam is scheduled.

LEVEL OF ENGLISH ASSESSED THROUGH A COMPUTER-BASED TEST DURING THE BACHELOR'S DEGREES OBTAINED AT THE UNIVERSITY OF MILAN. English levels B1 and B2 achieved no more than four years previously are deemed valid. The verification is automatic with no need to attach any certificate during the application phase.

EXPERIENCE OF STUDY ABROAD AS PART OF THE TRAINING PROGRAM

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 30 different 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 Spanish, French 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, which last 3 to 12 months, through a public selection procedure.

Ad hoc commissions will evaluate:

- 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 generally begins around February each year with the publication of a call for applications specifying the destinations, with the respective programme duration, requirements and online application deadline.

Every year, before the deadline for the call, the University organizes informative meetings to illustrate opportunities and rules for participation to students.

Erasmus+ scholarship

The European Union grants the winners of the Erasmus+ programme selection a scholarship to contribute to their mobility costs, which is 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.

Learn more at <https://www.unimi.it/en/international/study-abroad/studying-abroad-erasmus>.

Responsible for Natural Sciences: prof. Morena Casartelli.

For assistance, please contact:

International Mobility Office
 Via Santa Sofia 9 (second floor)
 Tel. 02 503 13501-12589-13495-13502
 E-mail: mobility.out@unimi.it
 Desk opening hours: Monday to Friday 9 am - 12 noon

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

Curriculum selection

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

CURRICULUM: [F2B-A] Ecosystem analysis, monitoring and management

Qualifying Training 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 present - also in relation to the anthropic presence - and in the geological past. It aims to outline the conceptual tools for environmental conservation, defense and management. The curriculum is addressed to students who want to extend and deepen their culture in the field of nature and environment, maintaining the traditional balance between abiotic and biotic factors, to obtain an organic and synthetic vision of nature and environment.

Skills acquired

- A.
- In-depth knowledge and understanding of the biotic and abiotic components of ecosystems, their conservation and enhancement, and land management.
 - In-depth knowledge of the most important processes that control the quality of the environment and the conservation of biodiversity and geodiversity.
 - Understanding of the interdisciplinary aspects of the studies on environment.
 - In-depth knowledge of informatic tools useful for the acquisition and analysis of geographic data and georeferenced naturalistic data.
- B.
- Ability to independently use the most important experimental methods in Natural Sciences and to describe, analyze and critically evaluate the data collected in the laboratory and/or in the field.
 - Ability to apply knowledge about the components of the ecosystems and their interactions, monitoring procedures and land management practices.
 - Ability to effectively use the English language in science.
- C.
- Ability to choose the appropriate techniques for the analysis of biotic and abiotic components of ecosystems.
 - Ability to evaluate in detail the social and ethical implications in the planning of interventions on the natural environment.
- D.
- Ability to communicate orally and in writing to a public of experts with language properties.
 - Ability to use the new communication technologies.
 - In-depth knowledge of a second European language.
- E.
- Ability to use scientific updating tools and to access scientific literature produced in at least one European language.
 - Capacity to understand the multidisciplinary and interdisciplinary aspects of the Natural Sciences.
 - Ability to develop skills to perform research, acquired through training activities and the elaboration of the thesis.
 - Ability to use the new communication technologies tools (e-learning platforms)

Professional profile and employment possibilities

Graduates 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;

Career opportunities for this master's degree can be found in the public sector, School, University, research bodies (CNR, ENEA), management companies and environmental services, Ministries, Higher Institute for Environmental Protection and Research (ISPRA), Regional Agencies for the Protection of the Environment (ARPA), Higher Institute of Health, Experimental Stations, Archaeological Superintendence, and in the private sector, where graduates will be able to carry out their activities in different types of companies and in the increasingly numerous agencies and cooperatives of consultancy and sustainable use of the territory. In addition, the skills of the master's degree can be of support to the Administrations of the Regions, Provinces, Municipalities, Mountain Communities, Environmental Associations, Foundations that operate in the management of environmental issues and in scientific publishing and dissemination.

1st COURSE YEAR Core/compulsory courses/activities Curriculum-specific features Ecosystem analysis, monitoring and management		
Learning activity	Ects	Sector
Methods in Ecosystem analysis	12	(12) GEO/04, (12) BIO/07, (12) BIO/03
Total compulsory credits		12
Further elective courses Curriculum-specific features Ecosystem analysis, monitoring and management		
Astronomy	6	FIS/05
Environmental chemistry	6	CHIM/12
Geographic Information Systems and Environmental Modelling	6	INF/01
Environmental economics and policy	6	AGR/01
Population Biology and Genetics	6	AGR/07
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
Applied palaeoecology	6	GEO/01
Biominalization	6	GEO/01
Environmental Geochemistry	6	GEO/08
Gemology	6	(6) GEO/06, (6) GEO/09
Geological evolution of a habitable planet	6	GEO/02
Geology of the Mediterranean area	6	(6) GEO/03, (6) GEO/07
Stratigraphic Paleontology	6	GEO/01
Adaptation of animals and plants to environment	6	(6) BIO/09, (6) BIO/04
Anatomy and physiology of the integrated systems	6	(6) BIO/09, (6) BIO/06
Animal behaviour	6	BIO/05
Applied geobotany	6	BIO/02
Biogeography	6	(6) BIO/05, (6) BIO/02
Laboratory methods for biodiversity	6	(6) BIO/06, (6) BIO/05, (6) BIO/01
Palynology	6	BIO/02
Phylogeny and evolution	6	BIO/05
Wildlife management	6	BIO/05
Anthropology	6	BIO/08
Control strategies for insect pests and vectors	6	(6) VET/06, (6) AGR/11
Forensic sciences	6	MED/43
Geophysics for natural risks	6	(6) GEO/12, (6) GEO/11
Mathematical Modeling	6	MAT/07
Mircopedology Laboratory	6	AGR/14
Principles And Dynamics of the "Critical Zone"	6	AGR/14
Symbiosis and parasitism	6	AGR/11
Vertebrate Paleontology and virtual Paleontology	6	GEO/01
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

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 present - also in relation to the anthropic presence - and in the geological past. It aims to outline the conceptual tools for environmental conservation, defense and management. The curriculum is addressed to students who want to extend and deepen their culture in the field

of nature and environment, maintaining the traditional balance between abiotic and biotic factors, to obtain an organic and synthetic vision of nature and environment.

Skills acquired

- A.
- In-depth knowledge and understanding of the biotic and abiotic components of ecosystems, their conservation and enhancement.
 - Understanding of the interdisciplinary aspects of the studies on environment.
 - Knowledge of methodologies and technologies to operate in scientific dissemination and communication.
 - Knowledge of the psycho-pedagogical and anthropological-sociological aspects of scientific teaching.
- B.
- Ability to organize naturalistic data for dissemination and communication.
 - Ability to disseminate the basic concepts of Natural Sciences to a non-specialistic audience and students in various school settings.
 - Ability to propose evaluation processes for education.
 - Ability to effectively use the English language in science, education and teaching.
- C.
- Ability to evaluate how to disseminate knowledge on nature and environment
- D.
- Ability to communicate orally and in writing to a public of experts and to a non-specialist public with language properties.
 - Ability to use the new communication technologies.
 - In-depth knowledge of a second European language.
- E.
- Ability to use scientific updating tools and to access scientific literature produced in at least one European language.
 - Capacity to understand the multidisciplinary and interdisciplinary aspects of the Natural Sciences.
 - Ability to develop skills to perform communication and dissemination, acquired through training activities and the elaboration of the thesis.
 - Ability to use the new communication technologies tools (e-learning platforms) also for education.

Professional profile and employment possibilities

Graduates 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, in the following classes: 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. It also allows students from the three-year degree in Natural Sciences of the University of Milan to fully acquire the requirements for the class A-28 (ex A059) - Mathematics and science for first grade secondary school (attachment A of DM-259-17). The curriculum also allows the student to fully acquire the 24 CFUs in the anthropo-psycho-pedagogical disciplines and the teaching methodologies and technologies required for all competition classes by the current law.

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		
Astronomy	6	FIS/05
Comunication 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	(6) MAT/03, (6) MAT/04
Environmental economics and policy	6	AGR/01
Fundamentals of psychology	6	M-PSI/01
General pedagogy	6	M-PED/01
Methods of communication	6	SPS/08
Applied geomorphology	6	GEO/04
Geomorphological heritage and geodiversity	6	GEO/04
Plant ecology	6	BIO/03
Geological evolution of a habitable planet	6	GEO/02
Geology of the Mediterranean area	6	(6) GEO/03, (6) GEO/07
Stratigraphic Paleontology	6	GEO/01
Anatomy and physiology of the integrated systems	6	(6) BIO/09, (6) BIO/06
Biogeography	6	(6) BIO/05, (6)

			BIO/02
Cell biology	6	(6) BIO/06, (6) BIO/16, (6) BIO/01	
Human Anatomy	6	BIO/16	
Phylogeny and evolution	6	BIO/05	
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	AGR/11	
Urban and regional geography	6	M-GGR/01	
Vertebrate Paleontology and virtual Paleontology	6	GEO/01	
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	