UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2022/23
BACHELOR
Geological Sciences (Classe L-34)
enrolled from 2014-2015 academic year

HEADING

Degree classification - Denomination and code:	L-34 Geology
Degree title:	Dottore
Length of course:	3 years
Total number of credits required to complete programme:	180
Years of course currently available:	1st , 2nd , 3rd
Access procedures:	Open, subject to completion of self-assessment test prior to enrolment
Course code:	F65

PERSONS/ROLES

Head of Study Programme

Prof. Massimo Tiepolo

Degree Course Coordinator

Prof Massimo Tiepolo

Tutors - Faculty

Per la laurea Triennale sono disponibili vari tutori che forniscono assistenza per raggiungere gli obiettivi che gli studenti vogliono perseguire e per la scelta di corsi opzionali.
Docenti Tutor, e per la compilazione dei piani di studio:
Prof. Marco Balini, (ambito geologico stratigrafico paleontologico- strutturale);
Prof.ssa Tiziana Apuani, (ambito geologico applicativo - geomorfologico);
Prof. Giovanni Grieco, (ambito mineralogico-petrografico geochimico);
Prof. Roberto Sabadini (ambito geofisico).

Degree Course website

https://geologia.cdl.unimi.it/it

Via Botticelli, 23 al II piano riceve quando disponibile o su appuntamento via mail Email: massimo.tiepolo@unimi.it

Course management

Ufficio per la Didattica, al momento il ricevimento avviene solo via mail scrivendo a: cclsg@unimi.it https://www.unimi.it/it/corsi/corsi-di-laurea/scienze-geologiche Email: cclsg@unimi.it

Libraries

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

Student registrar

Via Celoria, 18 - 20133 Milano 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

The general objectives of the degree programme in Geological Sciences are to develop: a solid, basic understanding of the main areas of Geological Sciences, individual capability in choosing and implementing methods and techniques in the relevant fields of scientific investigation, suitable training for handling and integrating future scientific and technological progress, and the skills to deal with the fundamental processes of exogenous and endogenous Earth systems correctly.
The course aims to produce graduates with the following:
- a good understanding of the fundamentals of Mathematics, Physics, Chemistry and IT to be able to quantify and interpret geological processes and the structure of the Earth;
- a solid, basic understanding of all areas of Geological Sciences to be able to recognise and interpret the natural mechanisms that are characteristic of the geological environment;
- analytical skills in field geology, with respect to basic geological mapping in different territories;

- analytical laboratory skills, with respect to characterising geomaterials and their behaviour;
- technical skills in the use of basic geological surveying tools;
- ability to gather and process data using IT methods which are both general and specific to the geological sciences;
- ability to apply mathematical models that simulate geophysical and geological processes.

Expected learning outcomes

The degree programme aims to define, characterise and comprehend current and past events, consider evolving scenarios and plan human intervention. Geologists read records of the Earth's evolution captured in rocks and fossils, compare them with what is happening in front of our eyes, and plan human impact on Nature, as every action afffecting the environment entails a change to the surface dynamics of the Earth's system.

The degree programme in Geological Sciences is based on the previous learning educational syllabus, but is the result of a review of the prior, well-established approach; the framework has been updated to include more scientific rigour to achieve a general foundation in learning on how to use method and application technology. In order to balance the numerous requirements of a scientific education, the relevant professional application and employment, the course has maintained a multidisciplinary focus and is designed to provide a highly sought-after scientific education.

The graduate must be identified: for a robust ability to understand the territory, in terms of superficial and deep geological structures; for understanding the temporal development of the natural mechanisms that influence the evolution of the territory; for the ability to process data collected in terms of modern cartographic representation; for the ability to recognize the evolution of the geological environment, also in relation to the anthropic activity.

In compliance with the principles of European harmonization, the outgoing skills developed by graduates during the degree course meet the specific requirements listed below according to the Dublin descriptor system:

- Knowledge and understanding - ability to think in a large-scale space-time context typical of Earth Sciences; understanding of a multi- and interdisciplinary systemic approach to complex natural systems, with recognition of the processes responsible for the formation of rocks; knowledge of safety rules; ability to work independently.

The acquisition of the knowledge and understanding skills will be verified by passing the exams, and through laboratory and field activities.

- Ability to apply knowledge and understanding - ability to accurately record and describe natural materials; to independently analyze geomaterials in the field and in the laboratory and to describe, analyze, and report the results. Ability to apply quantitative methods with a professional approach to geological problems in a broad context. Ability to operate through informatic systems.

The acquisition of the skills to apply the knowledge and understanding will be verified through the integration of field and laboratory exercises for the application of quantitative methods. Examination tests will include the preparation of written documents and practical tests.

- Making judgments - assessment of the complexities of the natural environment; interest in quality; recognize the responsibilities of Earth Sciences and their role in the society.

Acquisition of independent judgment will be verified by evaluating the acquisition of ethical principles towards nature and the environment. The ability to estimate the quality and reliability of geological data aimed at defining geological risk and correct use of the natural resources will be verified.

- Communication skills - oral and written communication in the mother tongue; knowledge of technical language in a second language, ability to team-working by correctly transferring information, ideas, problems and solutions related to Earth Sciences. Ability to speak with both specialist and non-specialist operators.

These results will be achieved and verified, in particular, through the preparation of the final dissertation, normally related to the training internship activity. The latter must be written by the student at the end of the course of study and presented orally to a specific commission during the final exam. The student will also have to prepare documents in digital form through the use of commonly used software aimed at promoting synthetic and effective communication.

- Learning skills - Ability to develop and acquire additional skills to manage complex information deriving from a multidisciplinary approach to the natural environment; ability to consult databases and other information on the network necessary for continuous updating.

Acquisition of learning skills will be verified by passing the exams of the third year and by the final test which normally require the student to consult databases and scientific bibliography in foreign language as well as personal deepening of topics not covered in common teaching activities.

Professional profile and employment opportunities

Geological Science graduates will be able to embark on careers in which geologists hold specific, purely operational skills, as defined by legislation (Presidential Decree of the Republic no. 328 dated 5 June 2001), relating to the capture and representation of field and laboratory data using direct and indirect methods. The professional role of geologist is officially recognised by Italy's national organisation of geologists, through membership in its B category (Junior Geologist) after passing a state exam.

Some examples of the various careers open to graduates are outlined below. They include academic, scientific and highly specialist professions, within the scope of implementation and technical-operational support commensurate with the knowledge acquired on the course.

- Updating and amending geological maps, both technically and thematically.
- Operational support during geophysical and geological surveys aimed at carrying out civil engineering works, prospecting and characterising energy, mineral and water resources, and monitoring the environment.
- Land planning; operations for hydrogeological setting and protection, in addition to safeguarding and containing risk areas.
- Environmental control to safeguard water resources, the remediation and decontamination of aquifers, polluted sites and

the disposal of waste.
- Industrial quality control; the technological use of geomaterials in the engineering, chemical and electronics industries; techniques for using decorative stone materials, gemmology.
- Protection of cultural and palaeontological heritage, preservation of historic sites, geoarchaeology.

Initial knowledge required

Admission requirements:
Admission to the Bachelor's degree programme in Geological Sciences is open, subject to a mandatory, though non-selective, assessment test before enrolment.
Applicants to the degree programme in Geological Sciences must hold an upper secondary-school diploma or an equivalent qualification obtained abroad.

Admission assessment:
Candidates will have to sit for the TOLC (Test Online CISIA) at the University of Milan or any other member university of CISIA (Consortium of Inter-University Integrated Access Systems). Register to the TOLC test on the CISIA website (www.cisiaonline.it).
The tests providing access to the degree programme in Geological Sciences are: TOLC-B, TOLC-S, TOLC-I.
Only after taking one of these tests, will you be able to enrol, WHATEVER THE RESULT:
TOLC-B divided into 4 sections: Basic mathematics (20 questions - 50 minutes), Biology (10 questions - 20 minutes), Physics (10 questions - 20 minutes), Chemistry (10 questions - 20 minutes).
TOLC-S, divided into 4 sections: Basic mathematics (20 questions - 50 minutes), Reasoning and Problems (10 questions - 20 minutes), Reading comprehension (10 questions - 20 minutes), Basic sciences (chemistry, physics and geology - 10 questions - 20 minutes).
TOLC-I divided into 4 sections: Mathematics (20 questions - 50 minutes), Logic (10 questions - 20 minutes), Science (10 questions - 20 minutes), Verbal comprehension (10 questions - 20 minutes).
Each question has 5 answer options, of which only one is correct.
Score: +1 for a correct answer, -0.25 for a wrong answer, 0 for a no answer.

Each TOLC test includes an additional English section, consisting of 30 questions to be answered in 15 minutes. This section does not count toward the overall test score.

Test structure and topics, registration procedures, dates, deadlines and any other useful information are set out in the call for applications.
See also https://www.unimi.it/en/study/bachelor-and-master-study/degree-programme-enrolment/enrolment-first-degree-programme
Candidates are required to show up with a valid ID on the date and time shown on the TOLC registration receipt.

Admission of transfer or graduate students:
Transfer students from a degree programme of the University of Milan, or another university, and graduate students will be waived from the test requirement only if admitted to years subsequent to Year I.
To this end, they will have to submit a specific request for prior assessment of their academic records using the online service as shown in the call for applications.
These candidates must provide a full transcript of records (listing exams, subject areas, credits, grades) and attach the course syllabi. For more details, please refer to the call for applications.
For the deadlines for applying for academic records assessments, please refer to the call.
The outcome will be notified via e-mail.
Students admitted to the first year will be required to take the test.

Additional learning requirements (OFA) and remedial activities:
Students who have not achieved at least 10 points in the Mathematics module will have to fulfil additional learning requirements (OFA).
Students with additional learning requirements will have to carry out remedial activities organised by the University in the period October-December, and then take a test to prove they have filled their gaps. Otherwise, they may not take any second-year exams before passing the Mathematics I and Computer Science exams.
Learn more at https://geologia.cdl.unimi.it/it/studiare/le-matricole

Compulsory attendance

In addition to required field training, attendance is mandatory for practical laboratories. Attendance is essential for students to learn and pass exams.

Internship criteria

The internship is a period of training in the actual world of work. It completes scientific-technological training with professional technical-practical skills in the field of geology. The internship awards 5 CFU and can be carried out in companies, professional firms or other organizations outside the University, as well as within the University. Learn more on internship procedures at

https://geologia.cdl.unimi.it/it/studiare/stage-e-tirocini
https://www.unimi.it/en/study/traineeships-and-work/traineeships-and-internships/activating-curricular-internship

Degree programme final exams

For the student to be admitted to the final exam, they must: a) have earned 176 CFU, including 3 CFU for proficiency in a foreign language; b) have written a final paper. By writing and defending the final paper, the student may earn an additional 4 credits.
The final exam consists in the discussion of an essay written by the student, covering:
a field test and/or laboratory measurements for basic geological investigation of geomaterials and/or the soil; or computer-based processing of geological data as well as simulations of geological and geophysical processes using mathematical models; or processing of geological data collected during the internship.
The final exam will award a number of CFU in line with thesis work. The paper may be in Italian or English.
Admission to the final exam:
- submit the APPLICATION FOR FINAL PAPER/THESIS to cclsg@unimi.it, using the form available at https://geologia.cdl.unimi.it/it/avvisi, well before starting thesis work;
- submit an online GRADUATION APPLICATION to the Student Registrar within the deadline
- deliver a soft copy to the board on the day of thesis defence and upload a thesis summary to www.riassuntitesi.scienzemfn.unimi.it by the dates notified by Student Registrars.
The exam board will award the following score points, which will count towards the final degree mark:
- from 0 to 3 points for internship work;
- from 0 to 2 points for the assessment of compulsory first- and second-year academic activities;
- from 0 to 6 points for thesis defence (assessment of the final paper).
https://www.unimi.it/en/study/bachelor-and-master-study/graduation

Campus

Teaching infrastructures for the Bachelor's degree programme in Geological Sciences are located in the three structures of the Department of Earth Sciences "A. Desio". The main teaching areas are: Geology and Paleontology (via Mangiagalli, 34); Mineralogy, Petrography, Geochemistry and Mineral Fields (via Botticelli, 23); Geophysics (via Cicognara, 7). Exercises for Minerals and Rocks Laboratory, Introduction to Geology and Laboratory (including Geological Cartography), Paleontology and Laboratory take place in dedicated teaching laboratories.

Laboratories

Teaching laboratories take place both in departmental structures, equipped with technical-scientific instruments and collections, and on-field, using customised logistics solutions.
Educational collections for the recognition and study of fossils, minerals, rocks, thin sections of rocks, topographic and geological maps are available in classrooms and in ad-hoc teaching laboratories. Computerized classrooms offer software for data processing and for the simulation of geological processes.
Scientific instruments available at the Department of Earth Sciences (http://www.dipterra.unimi.it/ecm/home/laboratori) help provide an introduction to optical, chemical and physical-mechanical characterization of minerals, fossils, rocks, soils, other natural or synthetic materials, as well as water and other terrestrial fluids. Practical exercises are carried out in laboratories of optical microscopy, scanning electron microscopy, transmission electron microscopy, mechanics of rocks, sedimentology, X-ray diffraction, X-ray spectrometry, absorption and emission spectrophotometry, visible and infrared spectroscopy.
Field laboratories take place in areas where students can learn geological cartography, process geological data and reconstruct the genetic processes of terrestrial materials (e.g. Valchiavenna Station).

Notes

In order to obtain their degree, students must be proficient in English at a B1 level under the Common European Framework of Reference for Languages (CEFR). This proficiency level may be certified as follows:
- Through a language certificate, earned within three years prior to the date of submission, at a B1 level or higher. For the list of language certificates recognised by the University, please review: https://www.unimi.it/en/node/297/). The certificate must be uploaded during the enrolment procedure, or subsequently to the portal http://studente.unimi.it/uploadCertificazioniLingue;
- Through a Placement Test, which is delivered by the University Language Centre (SLAM) during year I only, from October to December. Students who fail the test will be required to take a SLAM course.
The Placement Test is mandatory for all students who do not hold a valid certificate.
Those who do not sit the Placement Test by December, or who fail to pass the end-of-course test within six attempts, must obtain a paid certificate by graduation.

Computer skills

Students who are supposed to earn 3 credits (CFU) for basic computer skills, as provided by their degree programme, have to attend the Computer Science Course 3CFU.
It is a blended course with a compulsory final exam.
The first exam session is scheduled for January, and more will follow according to a calendar to be made available on the course delivery platform.

The Computer Science Course 3CFU course is managed by the CTU - Teaching and Learning Innovation and Multimedia Technology Centre.

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 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

The department of Earth Sciences offers opportunities for spending time as guest students at European universities and research centres both for attending courses/exams and for research and internship related to projects for graduate, post-graduate and PhD students. Studying and doing research in foreign universities is not only an important life experience and the occasion for thorough learning of a foreign language, but is also, and primarily, the opportunit for experiencing and acquiring different and more flexible learning approaches. Doing research and internship abroad may allow the access to facilities not available here (e.g., highly specialized labs), the performance of applied research on specific fields as well as the first-hand interaction with wider, international research groups. At present our partner universities in official Erasmus exchange agreements devoted to course/exams and, where indicated, research activity, are located in France, Germany, Greece, Spain, Holland, Switzerland. However the agreements for bursaries specifically devoted to applied research/internship can be stipulated with any other university or research centre with which any members of our department have or may establish collaboration on common research interests. For these research bursaries and, in general, for the correct validation of the research activity done by our students abroad, the role and the active involvement of a local member of the department is of fundamental importance, as he/she will act as official, competent internal scientific tutor for the student hosted in the guest foreign university. Students may access to “normal” Erasmus bursarships, allowing course/exam in addition to research activities in partner universities, as well as Erasmus Student Placement bursaries exclusively devoted to research/internship activities. The access to the different types of bursary is done by means of separate application procedures. The activity (course/exam or research) that the candidate will do in the guest foreign university has to be agreed with the local professors/tutors in both original and guest universities by means of the “Learning Agreement”. This document is of prime importance for the final validation and official administrative registration of the activity done abroad.

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

Learning activity		Ects	Sector
Chemistry and Laboratory		9	CHIM/03
English assessment B1 (3 ECTS)		3	ND
Geomorphology and Laboratory		10	GEO/04
Introduction to Geology and Laboratory		7	GEO/02, GEO/03, GEO/07, GEO/01
Mathematics I and Information Tecnology		9	(6) MAT/09, (6) MAT/01, (6) MAT/02, (6) MAT/03, (3) INF/01, (6) MAT/04, (6) MAT/05, (6) MAT/06, (6) MAT/07, (6) MAT/08
Mineralogy and Lithology Practicals		10	GEO/02, GEO/06
Paleontology and Laboratory		9	GEO/01
Physics I		6	FIS/01
	Total compulsory credits	63	

2nd COURSE YEAR Core/compulsory courses/activities common

Learning activity		Ects	Sector
Mathematics II		6	MAT/01, MAT/02, MAT/05
Mineralogy		6	GEO/06
Petrography and Laboratory		10	GEO/07
Physics II		6	FIS/01
Physics of the Earth and Laboratory		9	GEO/10
Sedimentary Geology and Laboratory		10	GEO/02
Structural Geology and Tectonics and Laboratory		10	GEO/03
	Total compulsory credits	57	

3rd COURSE YEAR Core/compulsory courses/activities common

Learning activity		Ects	Sector
Engineering Geology and Laboratory		9	GEO/05
Geochemistry		6	GEO/08
Geological Mapping and fieldwork practicals		9	GEO/02, GEO/03, GEO/07, GEO/09
Georesources		9	GEO/09
Topography and GIS		6	ICAR/06
	Total compulsory credits	39	

Elective courses

Applied Geophysics		6	GEO/11
Facies Analysis		6	GEO/02
Geotechnical field test and measures		6	GEO/05
Mineralogy of Earth and Planets and analytical methods		6	GEO/06
Palaeoecology		6	GEO/01
Raw Materials and Industry		6	GEO/09
Structural Analysis I		6	GEO/03
Volcanology		6	GEO/08

End of course requirements

Final Dissertation		4	ND
Training		5	GEO/02, GEO/03, GEO/04, GEO/05, GEO/06, GEO/07, GEO/08, GEO/09, GEO/10, GEO/01, GEO/12, GEO/11
	Total compulsory credits	9	

COURSE PROGRESSION REQUIREMENTS

The exams of the elective courses must be incurred after the characteristic of the same scientific-disciplinary or related

fields; they must also comply with the following mandatory prerequisites:

Learning activity	Prescribed foundation courses	O/S
Topography and GIS	English assessment B1 (3 ECTS)	Core/compulsory
	Paleontology and Laboratory	Core/compulsory
	Mathematics I and Information Tecnology	Core/compulsory
	Physics II	Core/compulsory
	Chemistry and Laboratory	Core/compulsory
	Physics I	Core/compulsory
	Mathematics II	Core/compulsory
	Sedimentary Geology and Laboratory	Core/compulsory
	Mineralogy and Lithology Practicals	Core/compulsory
	Geomorphology and Laboratory	Core/compulsory
	Introduction to Geology and Laboratory	Core/compulsory
	Mineralogy	Core/compulsory
Engineering Geology and Laboratory	English assessment B1 (3 ECTS)	Core/compulsory
	Paleontology and Laboratory	Core/compulsory
	Mathematics I and Information Tecnology	Core/compulsory
	Physics II	Core/compulsory
	Chemistry and Laboratory	Core/compulsory
	Physics I	Core/compulsory
	Mathematics II	Core/compulsory
	Sedimentary Geology and Laboratory	Core/compulsory
	Mineralogy and Lithology Practicals	Core/compulsory
	Geomorphology and Laboratory	Core/compulsory
	Introduction to Geology and Laboratory	Core/compulsory
	Mineralogy	Core/compulsory
Physics of the Earth and Laboratory	Physics I	Core/compulsory
Physics II	Physics I	Core/compulsory
Geological Mapping and fieldwork practicals	English assessment B1 (3 ECTS)	Core/compulsory
	Paleontology and Laboratory	Core/compulsory
	Mathematics I and Information Tecnology	Core/compulsory
	Physics II	Core/compulsory
	Chemistry and Laboratory	Core/compulsory
	Physics I	Core/compulsory
	Mathematics II	Core/compulsory
	Sedimentary Geology and Laboratory	Core/compulsory
	Mineralogy and Lithology Practicals	Core/compulsory
	Geomorphology and Laboratory	Core/compulsory
	Introduction to Geology and Laboratory	Core/compulsory
	Mineralogy	Core/compulsory
Georesources	English assessment B1 (3 ECTS)	Core/compulsory
	Paleontology and Laboratory	Core/compulsory
	Mathematics I and Information Tecnology	Core/compulsory
	Physics II	Core/compulsory
	Chemistry and Laboratory	Core/compulsory
	Physics I	Core/compulsory
	Mathematics II	Core/compulsory
	Sedimentary Geology and Laboratory	Core/compulsory
	Mineralogy and Lithology Practicals	Core/compulsory
	Geomorphology and Laboratory	Core/compulsory
	Introduction to Geology and Laboratory	Core/compulsory
	Mineralogy	Core/compulsory
Petrography and Laboratory	Mineralogy and Lithology Practicals	Core/compulsory
	Mineralogy	Core/compulsory
Structural Geology and Tectonics and Laboratory	Mineralogy and Lithology Practicals	Core/compulsory
Mathematics II	Mathematics I and Information Tecnology	Core/compulsory
Sedimentary Geology and Laboratory	Mineralogy and Lithology Practicals	Core/compulsory
Mineralogy	Chemistry and Laboratory	Core/compulsory
	Mineralogy and Lithology Practicals	Core/compulsory
Geochemistry	English assessment B1 (3 ECTS)	Core/compulsory
	Paleontology and Laboratory	Core/compulsory
	Mathematics I and Information Tecnology	Core/compulsory
	Physics II	Core/compulsory
	Chemistry and Laboratory	Core/compulsory
	Physics I	Core/compulsory

	Mathematics II	Core/compulsory
	Sedimentary Geology and Laboratory	Core/compulsory
	Mineralogy and Lithology Practicals	Core/compulsory
	Geomorphology and Laboratory	Core/compulsory
	Introduction to Geology and Laboratory	Core/compulsory
	Mineralogy	Core/compulsory