



University of Perugia - Department of Physics and Geology

Master of Science (MSc)

Geology for Energy Resources

Aim of the Course

The on-going transition phase of the energy sector poses a new and essential requirement for advanced education paths, specifically aimed at forming a new generation of Geoscientists, able to integrate the traditional knowledge of surface and subsurface geological architectures and processes, with innovative applications to the sustainable exploration and production of energy resources, including alternative energies.

In this framework, the MSc in Geology for Energy Resources is a two-years multidisciplinary course covering a range of subjects related to Earth Sciences, and their application to energy exploration and production. The course is aimed at students who intend to develop a professional position in the energy companies, environmental and geotechnical consulting industries, government agencies and for graduate studies at the doctoral level. The course has been structured in close collaboration with Eni-ECU (Eni Corporate University).

Starting from the statement that the expertise traditionally employed for hydrocarbon exploration and production can be now successfully extended to further geological applications (e.g. geothermal energy, natural gas and CO₂ storage, environmental pollution recovery, etc.), the educational program will provide to the students an in-depth knowledge of geology, sedimentary geology, stratigraphy, structural geology and geophysics related to the geological exploration with an emphasis in the application of modern concepts, methods and technologies (e.g. basin analysis, sequence stratigraphy, petroleum systems modelling, seismic interpretation).

The main purpose of this Master Course is to form technically qualified, complete professional geoscientists with the potential to become leaders in hydrocarbon, as well as in alternative energy and in other industrial companies; it is also an alternative course for graduates wishing to develop knowledge and skills for career as geoscientists in public research institutions.

At the end of the two-years path, graduates should be able: to apply the geoscience fundamentals; to solve geosciences-related problems; to analyze and synthesize using problem-solving skills; to demonstrate effective communication and management skills; to engage in lifelong learning and professional development.

During the two-years course of study, experts from Eni, as well as from other commercial and public companies, will supply seminars and practical courses on topics strictly related to the industrial applications of geology.

An integral part of the training is focused on fieldwork activities, which are used to consolidate the students' background by applying classroom-taught concepts in the field. Field trips are taken to areas of outstanding geological interest in support of the full understanding of surface and subsurface geological reconstructions using modern techniques.

Outline of the MSc in Geology for Energy Resources

The normal extent for obtaining the Master's degree is two years. To achieve the final title, the student must have acquired 120 credits (CFU). Each credit corresponds to 25 hours of student work. For each training credit, considering the different variable commitment (personal study) required, the corresponding number of hours is determined as follow:

Frontal lectures	7 hours
Practice in the classroom or lab	12 hours
Internships, preparation of the final Project and written Thesis	25 hours

The two academic years path (2023-2025) is organized in 4 semesters. The fourth semester is devoted to preparing the Master Thesis. Students can choose to carry out their thesis project at the Department of Physics and Geology of this University or to apply for a stage in Industries, Research Centers and foreigner Universities (in the frame of the Erasmus Program). In all the cases the final dissertation of the MSc Thesis will be defended at the Perugia University with at least a tutor from the Perugia teaching staff.

Academic Calendar - LM Geology for Energy Resources

The educational activities during the 2 academic years (2023-2024 and 2024-2025) are divided into two semesters.

1st year (2023-2024)

Type of activity	Course		Credits (CFU)
1st semester (September - December)			
Fundamental, to choose between the two	GIS (Geographical Information Systems)		6
	Mathematical Methods for Geosciences		
Fundamental	Sedimentology		9
Fundamental	Applied Geophysics		9
Fundamental	Global Tectonics		6
2nd semester (February - May)			
Fundamental	Seismic Expression of Geological Structures	Structural Geology - Mod 1	6
		Seismic Interpretation - Mod 2	6
Fundamental	Applied Geochemistry		6
Fundamental	Integrated Stratigraphy		6
Student option	1 optional course, chosen by the student during the first or second semester		6

2nd year (2024-2025)

Type of activity	Course		Credits (CFU)
1st semester (September - December)			
Fundamental	Petroleum Geology - mod. 1 (Petrophysics and Well Log interpretation), including 1 Eni seminar		6
Fundamental, to choose between the two	Petroleum Geology - mod. 2 (Exploration and Petroleum System Modeling), including 1 Eni seminar		6
	Geothermics		
Fundamental, to choose between the two	Environmental Geology		6
	Applied and Environmental Mineralogy		
Fundamental, to choose between the two	Micropaleontology		6
	Applied Hydrogeology		6
Student option	1 optional course, chosen by the student during the first or second semester		6
Supplementary educational activity	Geological Field Trips		3

Optional courses: students can choose as optional among all the courses offered by the University of Perugia. The optional courses given in *English*, offered by the Department of Physics and Geology are:

Optional courses held in English	Semester	CFU
Sedimentary Petrography	first semester	6
Reservoir Geology	End of the first semester of the II year	6
Ore deposits and sustainable Mining	second semester	6
Earth System Science	first semester	6
Environmental Geochemistry	second semester	6

The optional courses given in *Italian*, offered by the Department of Physics and Geology are:

Optional courses held in Italian	Semester	CFU
Paleontologia dei Vertebrati	second semester	6
Geologia dei Terremoti e Rischio sismico	first semester	6
Rilevamento geologico-tecnico e monitoraggio	first semester	6
Chimica Ambientale	first semester	6
Geomatematica	first semester	6

It is recommended to complete the study plan immediately after enrollment procedure, at the beginning of the first semester.

Calendar of the teaching activities

Semester	Lectures	Period of exams	Sessions
1 st	from 25/09/2023 to 12/01/2024	from 20/11/2023 to 24/11/2023	1
		from 15/01/2024 to 23/02/2024	2
2 st	from 26/02/2024 to 31/05/2024	from 25/03/2024 to 29/04/2024	1
		from 03/06/2024 to 31/07/2024	2
		from 02/09/2024 to 20/09/2024	2

Teaching methods and Assessment

The course is entirely delivered in English, and therefore it is required a properly certified (see below) knowledge of English language corresponding to the European level B2 or equivalent. If the student is lacking a B2 certification, his/her English language knowledge will be evaluated by an interview.

The training activities will be performed with different modalities, such as frontal lectures, practical work (in classroom and laboratory), seminars, training courses, individual and assisted studies, field works.

The practical activities intend to develop the student's ability to solve efficiently problems, to work independently, and to develop skills in team-working and data sharing. Exercises will allow the teacher to verify the learning level of each student. To improve student's skills, seminars and meetings with experts will be organized each year.

Lecture attendance is strongly recommended for all courses; attendance at scheduled seminars and fieldworks is mandatory. The credits are acquired after positive assessment of profit (exams). Evaluations have individual character and may consist of written and/or oral and/or exercise to be performed in laboratory or in the field. All activities allowing acquisition of credit must be assessed. The evaluation of the students is made by specific committee, consisting of at least two teachers. The mark is expressed in thirties. The composition of the committees and the calendar of exams are published on the website at the beginning of each academic year.

Pre-Requisites

Curricular pre-requisites are:

- Bachelor Degree, preferably in Geology, or in topics related with geoscience; a basic knowledge on geoscience is strictly required;
- Basic training in mathematics, physics and chemistry;
- Bachelor Degree (translated in English or Italian);
- Transcript (in English, any format);
- Motivation Letter (in English, any format);
- English proficiency certificate for non-English mother tongue (see below).

Applications must be sent by post to Dr. Elisabetta Brunetti

at: Dipartimento di Fisica e Geologia, Via Pascoli, 06123 - Perugia (Italy)

or by **email** to: segr-didattica.fisgeo@unipg.it

Applications will be evaluated by a committee of the Department of Physics and Geology

Transfers

Procedures and criteria for the recognition of credits acquired in other courses of study.

As for the recognition of credits, requests submitted by individual students will be examined by a committee and the earned credits will be evaluated considering the general criteria set out below.

If enrolled from study programs of the same class, the committee will recognize every credit earned by the student in the previous curriculum. If enrolled from different class, the committee will evaluate the congruity of the teaching program with that of this Master Course.

Previously acquired knowledges and professional skills not corresponding to specific teaching courses will be checked by the committee regarding their consistency with the objectives of the Master Course. In any case the recognized credits will never exceed the amount of 12 CFU. The committee and the advisor of the Master Course will provide assistance to the student in compiling the individual study plan.

The credits earned by students in the context of international study programs at Universities in force of bilateral agreements with the University of Perugia will be recognized with reference to the European Credit Transfer System (ECTS). Credits earned by students in other Italian Universities, European Union or in other countries not following the ECTS system, will be recognized on the basis of the documentation provided by the student. In the event of a bilateral agreement between the University of Perugia and the establishment of origin, we will proceed in accordance with the terms of the agreement.

Final exam

After the exams, students undertake an independent project (Thesis). The final exam aims to test the ability of the student to work independently and to present and discuss the results of an original work on a specific topic. Students are expected to demonstrate independent thinking, critical and creative analysis, technical judgment in their project work, and to manage both the technical analysis and time-management aspects of the project. The thesis is carried out with the supervision of a teacher (Supervisor), belonging to the teaching staff of the Geological Courses of the

Department of Physics and Geology (Perugia University) eventually with one or more co- Supervisors. The co-Supervisor must be expert in the topic of the thesis and not necessarily belonging to an academic staff. The student makes his/her dissertation at the presence of a special committee appointed by the educational structure of reference.

The thesis can be written in Italian (with extended abstract in English) or in English (with extended abstract in Italian). The committee is composed of 7 professors, including the thesis Supervisor. For the evaluation and the final score the committee will take into account of the quality of the thesis and presentation and also of the whole student career. At the final examination up to ten points will be awarded, that will be added to the base score resulting from the weighted average of the exams obtained during the two years of the course. If the final score is equal to or greater than 110, the committee, only if unanimously, may give honors (110 *cum laude*).

Tutoring

The tutorial activities are organized and managed by the Director of the Geological Courses.

The tutors for the Academic Year 2023/2024 will be Profs. Massimiliano Porreca, Giorgio Minelli and Amalia Spina. The advisor of the Master Course is Prof. Massimiliano Porreca.

Minimum language requirements for the admission

English B2 Level

Exemption from the English language certificate

Applicants in one of the following conditions could be exempted from the submission of an English language certification:

- attendance of a least one year of studies in the English language in a High/Secondary School; or
- possess of an educational qualification acknowledged as equivalent to the Italian High School Diploma, issued by a High/Secondary School where classes are held in the English language; or
- possess of a Bachelor (or equivalent) degree obtained in a university where classes are held in the English language.

In order to be exempted from the submission of an English language certification, applicants must enclose an official declaration/certification, on headed paper and duly stamped, attesting one of the above-mentioned conditions and clearly specifying "the medium of instruction is English".

If none of the above-mentioned conditions is verified, then the evaluation of English language will be carried out by an interview promoted by internal commission of the Department of Physics and Geology.

DIRECTOR OF THE GEOLOGICAL COURSES

Prof. Corrado Cencetti