

EUROMIN



Bologna-wide Euro-degrees in Mineral Sciences – a Tuning approach



An Erasmus PROG project



**coordinated by the Eötvös L. University, Budapest
(October 2005 – September 2008)**

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Cover design

All the images on the cover are related to diamond, a mineral multivariably linked to mineral sciences.

Diamond is the most abundant form of carbon in the universe. On Earth, it forms under high pressure at great depths, so conveys us information about the conditions prevailing in the mantle, an important topic for mineral scientists and petrologists.

Diamond itself is the most precious among gemstones. Beside the **image of a cut diamond**, also the **diamond structure** is shown on the cover.

As diamond is the hardest naturally occurring material, it is at the top (Mohs-hardness 10) of the empirical Mohs-hardness scale. This scratch resistance scale was created by Friedrich Mohs, a German mineralogist in 1812, and since then, it is one of the very basic things to learn in any mineral sciences curricula. (The scratch resistance method for determining hardness has even deeper roots, back to antiquity, having first been mentioned by Pliny the Elder in his *Naturalis Historia circa* A.D. 77.). The great hardness of diamond makes it an important material for industry: it is used as polishing material and in cutting devices. It also reinforces drilling devices aimed to explore the deeper regions of Earth.

The background photograph shows a 600 metres deep open-pit diamond mine, the **Udachnaya kimberlite pipe** in Russia. It is located just outside the Arctic circle at 66°26'N 112°19'E. It symbolizes mining and the mining-related exploration activities, in which many people with a degree in mineral sciences work. The location itself shows that often extreme conditions exist for explorer and mining geologists. The name of the kimberlite pipe (Russian: трубка Удачная, literally lucky pipe) also symbolizes an important issue in Mineral and Earth sciences, as well as mining: luck. No wonder that the traditional greeting „Good luck” is in wide use even today.

Diamond is really multifunctional: due to its transparency and pressure resistance, it is synthesized to build **diamond anvil cells (DAC)**. In diamond anvil cells, high temperature-high pressure experiments are conducted, allowing to observe the studied material throughout the whole experiment (*in situ observation*). DAC experiments rank among the most progressive and up-to-date research directions of mineral sciences

Finally, a **transmission electron microscope (TEM)** was put on the cover as it is considered one of the most sophisticated and at the same time very labour-intensive device for structure investigations, and thus it symbolizes the top of mineral sciences related education. Concerning diamonds, TEM is used to study the origin of colour in diamonds, and to describe the texture and quality of industrial synthetic diamonds.

Erzsébet Tóth
Cover designer

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**EUROMIN:
Bologna-wide Euro-degrees
in Mineral Sciences
A Tuning approach**

Booklet for employers

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Directorate-General Education and Culture
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(EACEA)*

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based on the results of the EUROMIN Consortium work

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1. Introduction to Higher Education in Mineral Sciences in the 21st century

1.1 Mineral Sciences in the 21st century

Mineralogy was one of the sciences that developed the earliest. It started to differentiate in Europe from the second half of the 18th century and it was the cradle of such now independent fields of science as Crystallography, Solid state physics, Crystalchemistry and Geology. Mineralogy has traditionally represented a **bridge between Material science and natural materials studied by Geology** (or more recently Geosciences), in general. This particular intermediate position became especially important in the last decades parallel with the growing importance of the **Environmental sciences**. It has played, and in the future decades it will play even more an essential role also in the planning and evaluation of **Space missions** (Moon, Mars, Venus programmes) and in designing and creating special **high-tech materials** (from microelectronics to technological materials). These recent trends in the evolution of Mineral Sciences are marked by the publication of several specialized textbooks in countries such as USA (the series of Reviews in Mineralogy of the Mineralogical Society of America) and Canada. In the last three decades, the gap between Material science and Geology has been widened remarkably by the rapid development of both fields of science (new analytical and synthesis techniques, mass application of computers, remote sensing etc.).

As a main component of the Earth Science system, Mineral Sciences focus on the understanding of Earth systems in order to learn from the past, understand the present and predict and influence the future. As compared to other Earth Sciences (Geology, Paleontology - Stratigraphy, Structural Geology, Tectonics, Hydrogeology etc.), Mineral Sciences primarily deal with the study of materials, traditionally with the natural ones, in the view of understanding natural processes and the history of Earth and other planets.

Minerals and rocks, especially the metal-containing ones (the classical "ore deposits") represented sine-qua-non natural resources for the life of humanity since the beginning of history; they traditionally constituted the object of mining and quarrying activities, which are still an important industry sector even today. In the modern times, this type of activities links Mineral Sciences to Engineering. In the same time, non-metallic minerals and rocks (the so-called "industrial minerals/ores") were used since the beginning of the human civilisation for producing ceramics, glass and as building materials. More recently, in the last centuries, the decrease of some natural resources (metals) and new needs for the society reflected in new approaches on industry led to the requirement for synthetic materials that could be produced in the laboratory, with much better controlled and pre-defined properties, but which re-created in many cases the natural materials. This created a new link of Mineral Sciences to Material Sciences, a link that is still under-evaluated and not understood at a wide scale by the society.

By summarizing these, it becomes self-evident that a knowledge and understanding of the Earth and its systems are of incalculable value both to the individual and to society at large, and that the first object of education in Earth Science is to enable this to be acquired. However, given the width of the subject, it is impossible to define a single core body of knowledge. Consequently a range of different approaches are required in the manner in which the vast body of knowledge which constitutes this subject is presented at undergraduate degree level throughout Europe.

1.2 The particularities of teaching/learning Mineral Sciences in Europe

As in the case of many other sciences, Europe represented the continent where Mineral Sciences were born, during the 14th century. Teaching/learning of Mineral Sciences was also developed here, at the level of secondary (vocational, as we would call it today) education related to mining, then as a component of the academic programmes in the traditional universities of sciences. In the 21st century, the situation of teaching Mineral

Sciences is very diverse and in most cases still related to local traditions, while on an international scale there is a clear trend in homogenisation and orientation towards multidisciplinary approaches.

Besides strong local traditions, one of the main objective factors of diversity in Europe, concerns the new, in general costly, analytical equipment needed for obtaining quantitative data in Mineral Sciences. There are significant differences among the different countries: the traditional EU Member States in general have better analytical facilities, while in general the former Eastern countries (now most of them new EU members) lack them. This led in the last decades to a more research-oriented teaching in the more developed countries also targeting the multidisciplinary areas, while in the less developed ones the teaching of Mineral Sciences remained more “traditional”, *i.e.* descriptive.

At the same time, most European countries cancelled their second cycle (Master) programmes in Mineralogy (important exceptions are Germany, and most of the former East European countries, see Annex 5), so that most of the current active European mineralogists graduated either in Physics/Chemistry or in Geology. The reason for stopping the courses on a national level basis was purely financial: everybody accepts that the special skills and knowledge of mineralogists cannot be replaced in modern society; on the other side, however, we do not need a large number of such experts (the **typical abundance of mineralogists in the European countries varies between 2 and 10 ppm of the population**), thus it was too expensive to keep that line alive based solely on the national education budgets.

These two tendencies made the position of the bridge over that gorge critical. There are more and more conflicts between the expected and the real knowledge and skills of the active mineralogists graduated not as mineralogists, but as chemists or geologists. Students (and their professors) should have a wider and wider knowledge on both fields, while there is less and less time allotted for a “partner” subject, like Mineral Sciences, in geology, respectively physics etc. curriculum.

An attempt for solving the problem mentioned above is to include Mineralogy in Master and PhD Schools and Programmes. This system could work if the basic undergraduate (first cycle) and, correspondingly graduate (second cycle) competences of the students graduating in different fields and enrolling in Mineralogy Master and PhD programmes were similar, or at least comparable. The practice of the last 15-20 years of the academic staff involved in the EUROMIN Consortium, as well as the test opportunities offered by the connecting, but independently-financed Erasmus Intensive Programmes (IP's) in Mineral Sciences implemented by the same Consortium in the last 10 years showed that this is not the case. During PhD programmes, students of Geology/Geosciences, respectively Material Science can be hardly trained to achieve the needed knowledge and skills to become mineralogists (being able to be innovative in both fields), as they are not adequately prepared during their previous studies. Only very few European universities, among them the universities represented in the EUROMIN Consortium, could keep multidisciplinary to some extent.

The Europe-wide introduction of the 1st and 2nd cycles by the Bologna Process brings back the possibility of **issuing Europe-wide 2nd cycle programmes (Master) in Mineral Sciences**, so that to help also the 3rd cycle programmes in overcoming the above described bad situation.

As in Earth Sciences in general, field work represents one distinctive component of a degree course especially at first and second levels, as compared to many other types of programmes in other subject areas. This limits the design of Mineral Sciences-related

distance learning strategies more at specialization courses level than at full programmes level. However, innovative proposals could address also this specific issue.

1.3 The EUROMIN Consortium

One of the main strength of the EUROMIN project was the large number of participating partner institutions (29 in total, including Co-ordinating institution) from both Socrates (19) and non-Socrates (4) countries, representing a broad geographical coverage. In the same time, there was a good representation of the EU Member States: 16 countries in the project, of which 5 member states accessing in 2004, including the country of the project co-ordinator (Hungary), the new EU members from 2007 (Romania and Bulgaria), two candidate countries: Socrates (Turkey), and non-Socrates (Croatia), and one potentially candidate country (non-Socrates): Serbia (see Annex 1).

More than that, the local co-ordinators from each partner institution are highly-appreciated professors in Mineral Sciences (MS) and worldwide experts in their field of scientific research. This is a guarantee for high quality of the proposals for the Euro-degrees in MS, at 2nd and especially at 3rd cycle levels, where both teaching and research are needed as complementary approaches.

The areas of specialisation/expertise of the partner institutions were mutually complementary: the universities in Austria and Germany preserved Mineralogy curricula at the undergraduate, and sometimes graduate level. The universities in Italy have a strong orientation towards Mineral Sciences applied to Material science or to cultural heritage (and more recently, forensic) issues, French universities are strong in geochemistry. Traditionally, in Spain and Portugal the Mineral Sciences curricula include topics related to Agricultural and Environmental sciences. Other partner universities are more applied-mineralogy oriented, such as towards ceramic industry (Switzerland etc.). As a summary, all the partners in the project represent mineralogy in broad terms, they are of intensive national and international connections and good reputation in Mineralogy.

This complex and complete partner composition was made possible by traditional, long term links that existed between the partner institutions in both fields of teaching Mineral Sciences, and Erasmus projects: the series of Socrates/Erasmus- based Curriculum Development projects (PROG/CDI, DISS, CDA) and the Intensive Programmes (IP's) in Mineral Sciences. The project Co-ordinator, Tamás G. Weiszburg has got a strong practice in co-ordinating international (TEMPUS and Erasmus) teaching projects, as well as in designing and implementing teaching activities from the course to the module and programme level.

The Aristotle University in Thessaloniki, Greece hosted the project website and regularly updated it with the materials prepared by the EUROMIN Consortium.

An important role in the project structure and organisation was played by the other members of the Steering Committee (SC): G. Ferraris (University of Torino, Italy) G. Christofides (Aristotle University in Thessaloniki, Greece), E. Tillmanns (University of Vienna, Austria), and J.-L. Robert (Orléans, France).

1.4 Degree profile(s) within Mineral Sciences

The answers to the EUROMIN Questionnaires 1, 2 and 3 (Annexes 2, 3 and 4) were used in mapping the current situation in the of the partner institutions and sometimes at national level. Additionally, an intensive Internet research was carried out (Annex 5).

As a summary result, the following typical degrees offered in Mineral Sciences have been identified by the EUROMIN Consortium:

1.4.1. Typical degrees offered in Degree programmes, with Mineral Sciences-related courses/modules

Cycle	Examples of Typical Degrees Offered (in alphabetic order) in bold, the most closely-related to Mineral Sciences
First	Applied Geosciences Earth and Economics Earth Sciences Engineering Geology Environmental and Resource Management Environmental Engineering Environmental (Geo)science Environmental Geology Exploration and Resource Geology Gemmology Geochemistry Geodesy Geological Engineering Geological Sciences / Geosciences Geology (including Mineralogy; Petrology; Sedimentary Geology; Resource Geology; Structural Geology; Tectonics; Palaeontology; and Stratigraphy); Geology & mineralogy Geomorphology Geophysics Georesource Management Geosciences and Environment Geotechnology Materials Science Materials Science and Engineering Metallurgical Processes Mineral Resources Engineering Mining and Geological Engineering Ocean Science Physical Geography Physical Sciences Physics, Chemistry and Earth Sciences Science and Technology for Diagnosis and Conservation of Cultural Objects Soil Science Technical Geology Technology for Conservation and Restoration of Cultural Heritage Tropical Environmental Science Waste Management

As also recognized by the Tuning Earth Science Subject Area Group (ESSAG), **first cycle (Bachelor) degrees** tend to be holistic with a wide range of subject descriptors. Earth Science may comprise a significant component in multi-disciplinary degrees covering resources, environmental management and planning, technical and engineering geology, materials science etc. As a rule, there is no specialised programme in Mineral Sciences offered by the European HEI at the undergraduate (first cycle) level. Only one programme offering a 1st cycle diploma in Gemmology (applied Mineral Science) was identified (University of Barcelona).

In some cases, there may be specialisations offered towards Mineral Sciences, usually in the third year of a typical 6 semester BSc programme in Geology or Geosciences. Such examples refer to:

BSc programmes in Geology – with specialisation in:

Mineralogy and Crystallography (University of Belgrade)

Petrology and Geochemistry (University of Belgrade)

Economic geology (University of Belgrade)

Geology in Museology, Administration, Archeometry (Brno University)

BSc programmes in Geological Science/Geoscience – with specialisation in:

Geochemistry

BSc programmes in Earth Sciences/ Physics, Chemistry & Earth Science – with specialisation in:

Geomaterials and environment

Magmas & Volcanoes

Mineralogy-Crystallography

BSc programmes in Material Science & Engineering – with specialisation in:

Material science

Metallurgical processes

An intensive research in the frame of the EUROMIN project concerned the currently-offered Mineral Sciences **Master (second cycle) programmes**, or other Degrees related to Mineral Sciences. More than 300 programmes have been identified with profiles that can be generally included in topics such as: Geology/Geosciences, Applied Geology/Geosciences, Earth sciences, Applied Earth sciences, Environmental Sciences, Applied Environmental sciences, Material sciences, Engineering, or some more remotely-related subjects to Mineral Sciences such as Cultural heritage, Forensic science etc. Masters (second cycle) degrees often have a strong vocational component and comprise both a course work and a thesis component. Academic Masters degrees also exist, usually involving one or more of the sub-disciplines listed above. These may be purely by research or involve coursework and a strong thesis component.

As a rule, the second cycle programmes are designed for 2 – 5 semesters, with a typical duration of 4 semesters (two years).

In the table below, only the “genuine” Mineral Sciences second degree are included. For a comprehensive list of the Mineral Sciences-related second cycle current programmes offered by HEI in Europe, please consult Annex 5.

Cycle	Examples of Typical Degrees Offered (in alphabetic order)	Examples of Typical Specialisations Offered (in alphabetic order)
Second	Crystallography Economic geology Geochemistry Geochemistry, mineralogy and petrology Geology Mineralogy and Crystallography Mineralogy and Petrology Ore deposits-Geochemistry Petrology Petrology and Geochemistry Petrology and Metallogeny	Applied Mineralogy and Petrology Environmental and Resource geochemistry Environmental Geochemistry Environmental mineralogy Minerals and Environment (EMMEP Erasmus Mundus programme) Gemmology Geology of Mineral deposits Geomaterials and geochemistry Metals and Energy Mineralogy and Material Science Mineralogy applied to cultural heritage

There are, however, Master programmes in Geosciences, Earth sciences, Environmental science or Material science that offer specialisation (mainly by research), in Mineral Sciences. These specialisations are included in the table above.

Third cycle (PhD) degrees are, by definition, very heterogeneous as far as the profile is concerned. They depend very much on the funding possibilities of each university, thus on the national/international research priorities. The most typical degrees are Doctorates by research, usually requiring examination and defence of a substantial and original piece of research described in a comprehensive thesis. The research undertaken during this period of training should contain material that is either worthy of publication, or has been published by the student.

As an example, in the table below there are some more “generic” subjects in which PhD studies are currently offered in Europe, which contain a significant Mineral Science component:

Cycle	Examples of Typical Degrees Offered (in alphabetic order)
Third	Crystallography Earth Sciences Environmental and Resource Management Environmental Engineering Environmental Sciences and technologies Experimental mineralogy Geobiology Geochemistry Geodynamics Geology Geochemistry Geology and Mineralogy Geosciences (cumulative format) Geotechnics Igneous, metamorphic and volcanic studies Magmatic and Hydrothermal processes Marine Sciences Mineralogy Mineral Physics Mining and Geology Mining Engineering Nanoscience Science and Technology of Materials

1.4.2. Typical occupations of the graduates in Mineral Sciences (map of professions)

A survey of the career opportunities offered to students graduating first, second and third cycles was done in all the EUROMIN partner institutions, as a result of the EUROMIN Questionnaire 2 (launched in June 2007). The career mapping was extended to national level. The last stage of this research was represented by an intensive internet search of the current (2008) career opportunities provided all over the world, but with a special focus on Europe.

An extensive list of job titles, according to the minimum qualifications requirements and according to the academic specialisation which was preferred, as indicated by the employers is included as Annex 6. Additionally, Annex 7 contains a list of useful websites for searching Mineral Sciences-related career opportunities.

In general, the job titles advertised by the employers are not specifically addressing graduates in Mineral Sciences; the profiles of the academic qualification required are in most cases Geosciences, Earth Sciences, Material Sciences and Engineering. But in many cases, the job description and the require qualifications and skills (competences) are directly related to the typical competencies offered by current or the proposed Mineral Sciences programmes. For increasing the employability chances for the students

graduating Mineral Sciences programmes (especially at second cycle, Master level), it seems very important to include courses/modules that explicitly relate to the competences required by the typical employers, such as: Mineral exploration/mining geology, Oil and gas industry, Geotechnical engineering, constructions and Land planning, Material science and technology, Environment and agriculture, Cultural heritage, Education (at academic and at secondary school level), Research (in Higher Education Institutions or in research institutes) and more recently, Waste management and Risk assessment.

The table below shows the typical jobs related to Mineral Sciences according to the degree:

Cycle	Typical jobs related to Mineral Science
First	<p>Mineral exploration/mining geology: Exploration geologist, Mineral specialist, Geochemist, Economic geologist, Mine geologist, Resource geologist, Geological advisor, Geoscientist, Open pit mining engineer, Wellsite Geologist, Sample Preparers - Minerals Processing, Technical Specialist Metal Extraction Products, Soil scientist, Superintendent, Geology Quality Assurance, Tailings Engineer, Analytical QAQC Officer etc.</p> <p>Oil and gas industry: Mineralogist, (Mud logging) geologist, Explorationist, Operations Geologist, Reservoir geologist, Instrument Analyst, Analytical QAQC Officer, Staff geologist, Technical Support Manager - Airborne Surveys</p> <p>Geotechnical engineering, constructions, land planning: Geotechnical Engineer, Civil and environmental engineer, Land surveyor, Town and Country Planner etc.</p> <p>Material science and technology: Responsible development geocomposites</p> <p>Environment and agriculture: Soil analyst, Environmental engineer, Environmental scientist, Contaminated Land Specialist etc.</p> <p>Waste management: Business Development Manager, Radioactive Waste Management Consultant, Waste and Mineral Planner, Waste/CQA Engineer</p> <p>Cultural heritage: Conservation / Historic Building Specialist etc.</p> <p>Teacher in secondary education (initial years) in Earth Science /Geography/Science</p> <p>Training, education (other sectors): National park guide, Natural protection worker, Tutor/Instructor Field studies</p> <p>Governmental: Mediatiation geological inventory etc.</p>
Second and Third	<p>Mineral exploration/mining geology: Project manager, Operations Manager - metallurgy and mineralogy, Database and applications manager, Landfill and Quarry Expert, Geologist - Business planning, Geoscience Trainer etc.</p> <p>Oil and gas industry: Carbonate/Clastic geologist, Head exploration geologist, Exploration License Team Leader, Tellus Client Manager etc.</p> <p>Consultancy (private agencies including those involved in site survey, environmental management and risk assessment): Geo-Environmental Engineer/Consultant, Environmental and Sustainability Consultant</p> <p>Universities (research and education)</p> <p>Public offices (Geological Surveys, Environmental Research Institutes including various agencies concerned with soil, water, physical planning, natural hazards, environmental conservation, agriculture): Inspector geoscientist, Customs officer/agent (cultural heritage issues), Environmental policy consultant, Environmental Assesor, Contaminated Land Risk Assessor, Catastrophe Risk Modeller, Remediation Engineer</p> <p>Related industries (water suppliers, geothermal energy, CO₂ sequestration, waste management etc.): Bid / Procurement Director Waste Management, Civil/Structural Engineers (Waste and Energy), Waste Project Manager etc.</p> <p>Teacher (Secondary School) in Earth Science /Geography/Science</p> <p>Museums and cultural institutions: Curator, Researcher, Director</p> <p>Media: Science journalist, Editor scientific journals</p> <p>Public health: Asbestos Analyst and Management Consultant, Asbestos Analytical Staff, Asbestos surveyor etc.</p>

A synthetic presentation of the sectors of activity and typical employers for the graduates of Mineral Sciences-related first, second and third cycle degrees is given in the table below, based on the results provided by Tuning and the European Federation of Geologists (EFG):

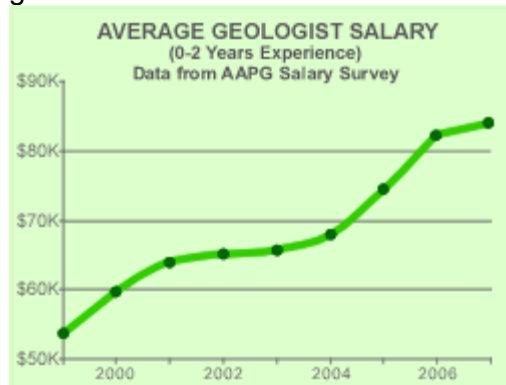
Title	Sectors of activity	Typical employers	Typical activities	1st cycle	2nd cycle	3rd cycle
Junior geologist	Private and Public companies	Industry		x		
Teacher in secondary education	Public	Government	Education	x		
Teacher in secondary education	Public	Government	Education	x		
Teacher in secondary education	Public	Government	Education	x		
Engineering geologist	Private and Public companies	Industry (hydrocarbons)	Production / Research		x	x
Engineering geologist	Private and Public companies	Industry (minerals)	Production / Research		x	x
Engineering geologist	Private and Public companies	Construction works	Production / Research		x	x
Engineering geologist	Private and Public companies	Geotechnics	Production / Research		x	x
Engineering geologist	Private and Public companies	Land-use planning	Production / Research		x	x
Engineering geologist	Private and Public companies	Environmental protection/reconstruction	Production / Research		x	x
Geologist	Private and Public companies	Industry (hydrocarbons)	Production		x	x
Geologist	Private and Public companies	Industry (hydrocarbons)	Prospecting / Exploration		x	x
Geologist	Private and Public companies	Industry (minerals)	Mining / quarrying		x	x
Geologist	Private and Public companies	Industry (minerals)	Prospecting / Exploration		x	x
Geologist	Public offices	Survey institutes	Research / Production		x	x
Geologist	Public offices	Research institutes	Research / Production		x	x
Geologist	Public offices	Soil-related	Research / Administration		x	x
Geologist	Public offices	Water-related	Research / Administration		x	x

Geologist	Public offices	Physical planning-related	Research / Administration		x	x
Geologist	Public offices	Natural hazards-related	Research / Administration		x	x
Geologist	Public offices	Environmental-related	Research / Administration		x	x
Geologist	Public offices	Agriculture-related	Research / Administration		x	x
Geologist	Public offices	Cultural heritage-related	Research / Administration		x	x
Geologist	Public offices	Forensic-related	Research / Administration		x	x
Geologist	Public offices	Public health-related	Research / Administration		x	x
Geologist	Public offices	Material science-related	Research / Administration		x	x
Geologist	Public offices	Construction materials-related	Research / Administration		x	x
Geologist	Public offices	Waste disposal-related	Research / Administration		x	x
Geologist	Public institutes	Research institutes	Research / Production		x	x
Geologist	Private companies	Waterworks	Consultancy		x	x
Geologist / Expert	Private agencies	Agencies	Consultancy		x	x
Geologist / Expert	Own businesses	Independent	Consultancy		x	x
Geologist / Expert	Public and Private institutions	Universities	Research / Education		x	x
Museum curator / director	Public and Private institutions	Universities / Regional administration	Education / Research		x	x
Science journalist	Private and Public companies	Media	Consultancy / Education		x	x
Teacher in secondary education	Public	Government	Education		x	x

As general remarks of the current job listings survey, it has to be stated that usually a BSc degree is considered as minimum education level required, but in many cases a MSc degree is preferred by the employers. Especially for senior, principal, team leader, manager etc., positions, there are usually pre-requisites such as minimum experience in the field, and sometimes minimum career level conditions.

1.5. Consultation with public (academic society) and private (employers, professional organisations) stakeholders

Based on the information from the mineral industry, it seems that for the moment, in spite of the general international economic context, ***“It’s a great time to be a geologist!”***



(Source: <http://geology.com/jobs.htm>, also for the associated figure).

The high natural resource prices, retirements and low enrolments help boost salaries for geologists. This is particularly valid for the petroleum and mineral resource companies that are offering geologists unprecedented salaries. The commodity prices are still at very high levels, fact that provides good opportunities for geologists seeking work in these areas. There are lots of interesting and good-paying jobs.

As one area of the Geological Sciences, Mineral Sciences could well find their well-deserved place into the work market. According to the conclusions of the Tuning Earth Science Subject Area Group (ESSAG), “in general, there is a healthy and ongoing debate about the relevance of Earth Science education to the needs of the profession and society”. This is mainly due to the fact that in many European countries, Earth Sciences-related professional bodies (associations) may offer degree accreditation, based on their long tradition of co-operation with Higher Education Institutions in Earth Science. In the same time, in Europe there has been a long term fruitful link between public stakeholders and the private ones (extractive, mining and hydrocarbon industries).

The internationalisation of the Geoscience profession (Norbury, 2004) and the accreditation of the **EUROPEAN GEOLOGIST (“EurGeol”) professional title** may well lead to a more regulated market than currently exists. It is important that this process involves closer links between all stakeholders. The EurGeol title was supported and formally accredited at the initiative of the European Federation of Geologists (EFG). Among the recommended fields of activity where an European Geologist could pursue a career, there are some closely-related to Mineral Sciences (in bold): Engineering geology, **Geochemistry**, Management, Computing engineering, Hydrogeology, **Environmental impact**, Geophysics, Geothermal energy and CO₂ sequestration, Natural hazards and Climate change, **Soil protection and geoheritage**, Resources and reserves: Oil and gas, **Resources and reserves: Minerals, Academic.**

The table below shows the Mineral Sciences-related Regulated professions in the European Union, according to the information included in the EU Regulated professions Database (<https://webgate.ec.europa.eu/regprof/>):

Profession	Countries
Architectural and environmental curator	IT, UK
Asbestos removal expert	DK, NL
Associate engineer	IE, IS
Building site coordinator	DK
Civil and environmental engineer	IT
Cleaning of monuments, facades and buildings	AT
Company technical consultant	CH, IT
Conservation/restoration technician	SI

Conservator/Conservator-restorer/Restorer/Renovator	LT, MT, PL, SK, SI
Consulting engineer	AT
Customs officer/agent	MT, PL, ES
Engineer	DE, IS, IE, IT, MT, UK
Environmental auditor	EE
Environmental consultant/Environmental policy	CZ, BG, EE, GR
Environmental engineer	GR, PT
Geologist	CY, CZ, GR, IE, IT, LI, PL, SK, ES, UK
Geologist	CZ
Geotechnical engineer	CZ, PT
Graduate professional engineer	IE
Higher level secondary teacher	FI, SE
Industrial engineer	GR, IS, IT, PT, ES
Jewellery making and cutting of precious stones	IT
Land surveyor	GR, CY, ES, UK
Local government administrator	GR
Manager of protected area	SI
Mine deputy	UK
Minerals surveyor	UK
Mining and metallurgy expert	PL, UK
Mining professions not elsewhere classified	PL
Mining project inspector	SI
Mining project/planning manager	PL, SI
Mining supervisor	PL
Museum director/Curator	GR, PL, SI
Museum worker	PL, SI
Museum worker	SI
National park guide	GR
Nature protection worker	SI
Organiser of adult education	SI
Platform manager (mobile oil drilling rig)	NO
Precious metals tester	CH
Production and management engineer	GR
Professions in the field of waste management and disposal	CZ, DK, UK
Research assistant	BE
Research fellow/ Research associate	IT
Researcher	SI
Restorer (of buildings)	CZ
Secondary school teacher	BE
Soil analyst	
Specialised teachers, not elsewhere classified	AT, CZ, GR, LU, NO, ES, SE, CH
Teacher of engineering	LU
Technical college teacher	IE, LU
Technical college teacher	LU
Technical section leader (mobile oil drilling rig)	NO
Town planner / Town and Country Planner	CY, DE, IE, LT, PL, NL, SI, UK
Underground professions not elsewhere classified	PL
University lecturer	AT, BE, NO, PT, SK, ES
University teacher/professor	FI, FR, NL, NO, SK, SE
Vocational education teacher/lecturer/professor	BE, CZ, FI, LT, NL, PL, NO, SI
Works supervisor	SI

Based on the example of the accreditation process of the European Geologist title, the EUROMIN Consortium recommends to the national and especially European professional associations (European Mineralogical Association, EMU) in Mineral Sciences to evaluate the possibility for starting

a similar procedure in the view of the accreditation of a European Mineralogist (EurMin) title. The Higher Education accreditation framework is going to be provided by the ***EuroMaster in Mineral Sciences*** proposed by the EUROMIN Consortium (see below).

1.6. Quality enhancement

The EUROMIN Consortium recognises the importance of quality enhancement throughout all aspects of degree design and delivery. Mineral Science training requires a wide range of teaching methods within the classroom, laboratory and in the field. However, we wish to emphasize the role of problem solving tasks within Earth Science education, in general, and in Mineral Sciences in particular.

According to the Tuning ESSAG report, the current trend towards a 'compensation culture', increasing costs and modularisation of degrees makes it increasingly difficult to implement a comprehensive fieldwork programme or work experience programmes within the framework of a First Cycle Degree. Professional societies normally require evidence that a graduate has undertaken considerable independent field work, either in the context of their degree studies and, or whilst supervised in the workplace, before awarding professional recognition. Students find field work attractive and it encourages them to study science subjects which contain a field work component. A comprehensive, safe, well planned and managed field programme will enhance the quality of almost all Earth Science degree programmes.

In the case of Mineral Sciences, additional to competences related to field work, stages in research laboratories or in industry laboratories would increase the quality of the educational process, especially in second degree (Master) programmes.

2. Key Competences for Mineral Science

The presentation of the key specific competences for Mineral Sciences is based on the common work of the EUROMIN Consortium obtained as a result of the need analysis in the preparation stage of the project at the home institutions and at national level, on the compilation of the EUROMIN studies based on Questionnaires 1, 2 and 3 (Annexes 2,3 and 4) and on the discussions that took place during the three project Business Meeting (the last two of them developing into Bologna Conferences). It was assumed that each successive Cycle will add new competences onto those already obtained. The competences in Mineral Sciences are presented below in comparison with the key subject specific competences identified by the Tuning Earth Science Subject Area Group (ESSAG) as characterising an Earth Science degree programme.

Comparison of Key generic and subject-specific competences for Earth Science (as defined by Tuning ESSAG) vs. Mineral Sciences (as defined by EUROMIN)

First Cycle	
Key Generic Competences	
Work both independently and in a team Basic general knowledge A grounding in basic scientific methodology Grounding in basic knowledge of the profession Oral and written communication in your native language Knowledge of a second language Elementary computing skills Information management skills Awareness of safety Ability to communicate Earth Science issues with the wider society An awareness of the importance of life long learning	
EARTH SCIENCE Key Subject Specific Competences (Tuning ESSAG)	MINERAL SCIENCES Key Subject Specific Competences (EUROMIN)
Show a broad knowledge and understanding of the essential features, processes, history and materials of System Earth. Recognize the applications and responsibilities of Earth Science and its role in society. Show adequate knowledge of other disciplines relevant to Earth Science. Independently analyse Earth materials in the field and laboratory and to describe, analyse, document and report the results. Be able to reason in large-scale spatial and, or temporal frameworks The application of simple quantitative methods to Earth systems. The capacity to gather, process and interpret qualitatively data from different sources	Show a broad knowledge and understanding of the essential features, processes, history and materials of System Earth. Recognize the applications and responsibilities of Mineral Science and its role in society. Show adequate knowledge of other disciplines relevant to Earth Science. Independently analyse Earth materials in the field and laboratory and to describe, analyse, document and report the results. Be able to reason in large-scale spatial and, or temporal frameworks The application of simple quantitative methods to Earth systems. The capacity to gather, process and interpret qualitatively data from different sources A good background in Mathematics, Physics and Chemistry applied to Mineral Sciences

Second Cycle	
Key Generic Competences	
<p>To demonstrate a comprehensive knowledge in at least one specialized area of Earth Science</p> <p>Be able to define, determine and implement a strategy for solving an Earth Science problem</p> <p>To be able to understand the interactions of Earth processes and test the results of these</p> <p>To produce a substantial report or thesis (including an executive summary)</p>	
EARTH SCIENCE Key Subject Specific Competences (Tuning ESSAG)	MINERAL SCIENCES Key Subject Specific Competences (EUROMIN)
<p>Research skills</p> <p>Capacity for analyses and synthesis</p> <p>Problem solving</p> <p>Information management skills (ability to retrieve and analyse information from different sources)</p> <p>An awareness of economic factors, especially in those courses with a strong vocational component.</p> <p>The ability to advise on the use of natural resources in the drawing up of development policies, legislation, plans and programmes</p> <p>A capacity for observing and understanding the environment</p> <p>The ability to employ good professional practices (e.g. legal, safe, responsible, environment and sustainable)</p> <p>An appreciation of natural hazards, their origin and relevance to society</p> <p>Rigor in sample-taking and data gathering, and in their processing, analysis, interpretation</p> <p>The capacity to gather, process and interpret, both qualitatively and quantitatively, data from different sources</p> <p>An understanding of surface processes including those affecting landscape</p> <p>Appropriate Earth mapping skills</p>	<p>Research skills</p> <p>Capacity for analyses and synthesis</p> <p>Problem solving</p> <p>Information management skills (ability to retrieve and analyse information from different sources)</p> <p>An awareness of economic factors, especially in those courses with a strong vocational component.</p> <p>The ability to advise on the use of natural mineral resources in the drawing up of development policies, legislation, plans and programmes</p> <p>A capacity for observing and understanding the environment</p> <p>The ability to employ good professional practices (e.g. legal, safe, responsible, environment and sustainable)</p> <p>An appreciation of natural hazards, their origin and relevance to society</p> <p>Rigor in solid matter sample-taking and data gathering, and in their processing, analysis, interpretation</p> <p>The capacity to gather, process and interpret, both qualitatively and quantitatively, data from different sources</p> <p>An understanding of surface processes involving solid matter, including those affecting landscape</p> <p>A solid background in Mathematics, Physics and Chemistry applied to Mineral Sciences</p> <p>Good analytical skills for understanding the data collection process and the limits of specific analytical methods</p> <p>Demonstrate a comprehensive knowledge in at least one specialized area of Mineral Sciences</p> <p>Appropriate skills in using mathematical apparatus for data processing and interpretation</p>

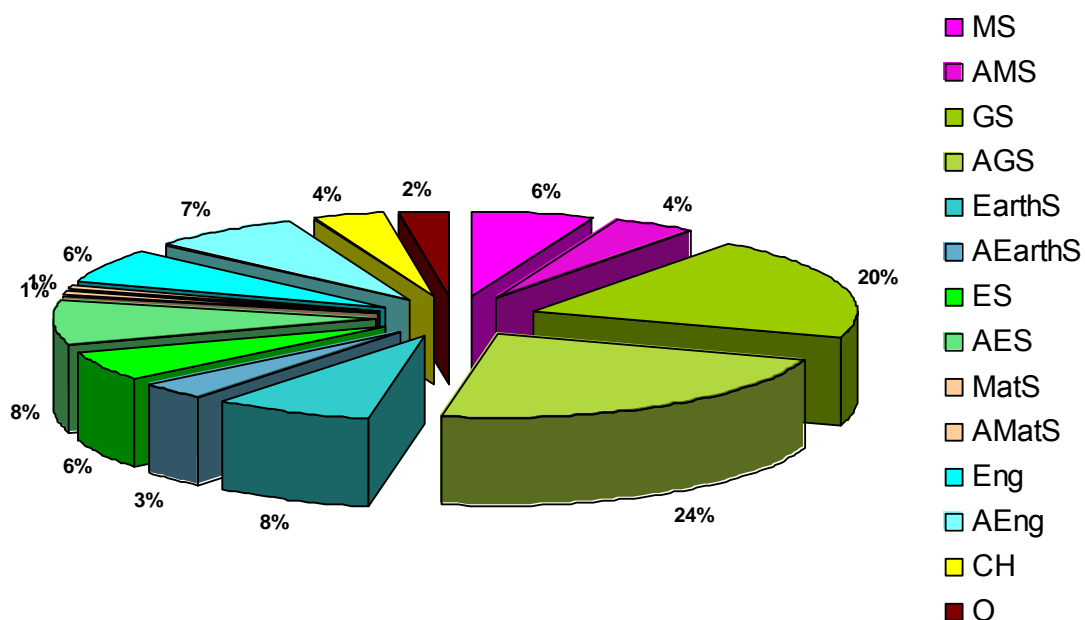
Third Cycle	
Key Generic Competences	
Demonstrate the ability to perform independent, original and ultimately publishable research in the field of Earth Science	
EARTH SCIENCE Key Subject Specific Competences (Tuning ESSAG)	MINERAL SCIENCES Key Subject Specific Competences (EUROMIN)
Creativity Critical and self-critical abilities Capacity for generating new ideas (creativity) Scientific leadership	Creativity Critical and self-critical abilities Capacity for generating new ideas (creativity) Scientific leadership

3. Second cycle (Master) degrees in Mineral Sciences

3.1. Review of the current situation

The EUROMIN Consortium studies based on the three Questionnaires, and the internet survey concerning the current offer of Mineral Sciences-related Master (second cycle) programmes of the European Higher Education Institutions led to the identification of almost 350 degree programmes in year 2008 (Annex 6). The statistical distribution among the relevant profiles for Mineral Sciences is presented in the figure below.

Partition of Mineral Sciences-related Master programmes in Europe according to their profile



Legend:

MS = Mineral sciences; AMS = Applied mineral sciences; GS = Geological sciences/Geosciences; AGS = Applied geological sciences/Geosciences; EarthS = Earth sciences; AEarthS = Applied Earth sciences; ES = Environmental sciences; AES = Applied environmental sciences (incl. Natural risks); MatS = Material science; AMatS = Applied material science; Eng = Engineering (including mining, oil and gas); AEng = Applied engineering; CH = Cultural heritage; O = Others.

3.1.1 Master programmes with Mineral Sciences profiles

As it can be seen from the figure, the **Mineral Sciences (including Applied MS) programmes** represent only 10 % of the total number of the related Master degrees. It is worthy to mention that a large number of partner institutions in the EUROMIN project are among the HEI in Europe that offer Masters in Mineral Sciences:

- Bulgaria: Sofia University "St. Kliment Ohridski", Faculty of Geology and Geography
- Ireland: National University of Ireland, Galway, Department of Earth and Ocean Sciences
- Romania: Babes-Bolyai University Cluj-Napoca, Faculty of Biology and Geology
- Serbia: University of Belgrade, Faculty of Mining and Geology
- Slovakia: Comenius University in Bratislava, Faculty of Natural Sciences
- Turkey: University of Istanbul, Faculty of Science

The profiles of these Second Cycle degrees may concern "Mineral Sciences" in general, or may be specialised in one or more of the Mineral Sciences themselves:

Mineralogy and Petrology
Crystallography
Petrology
Geochemistry
Economic geology
Ore deposits-Geochemistry
Gemmology

More recent trends in the evolution of society and, correspondingly, in the orientation of the Higher Education Institutions are illustrated by some less typical profiles referring to *Applied Mineral Sciences Master programmes*:

Mineralogy and Material Science
Environmental mineralogy
Mineralogy applied to cultural heritage
Applied Mineralogy and Petrology
Geomaterials and geochemistry
Environmental Geochemistry
Environmental and Resource geochemistry
Clinical, forensic and sports chemistry

3.1.2 Master programmes with other profiles, offering specialisation in Mineral Sciences

As it was expected, the greatest number of Mineral Sciences-related Master programmes (44 %) have a **Geology / Geological Sciences (including Applied) profile**. In some cases, some of these programmes offer a **specialisation in Mineral Sciences**, in many cases by research. Among these offers, several come from partner institutions in the EUROMIN project:

- Belgium: Catholic University Leuven, Department of Geology
- Croatia: University of Zagreb, Faculty of Science
- Czech Republic: Charles University in Prague, Faculty of Science
- France: University of Orleans, UFR Sciences
- Greece: Aristotle University of Thessaloniki, Faculty of Science
- Hungary: Eötvös L. University Budapest, Faculty of Sciences
- Italy: Università degli studi di Pisa, Faculty of Mathematical, Physical and Natural Sciences
- Russia: Lomonosov Moscow State University, Faculty of Geology

Other Master programmes that offer **specialisation towards Mineral Sciences** are related to **Earth Sciences**:

- Austria: University of Vienna, Faculty for Geosciences, Geography and Astronomy

or to **Environmental Sciences**:

- Hungary: University of Pannonia Veszprem, Faculty of Engineering

An ERASMUS MUNDUS programme in Engineering, “Minerals and Environmental Programme (EMMEP)”, implemented by several European universities (Wroclaw University of Technology, Poland; Rheinisch-Westfaelische Technische Hochschule Aachen, Germany; University of Exeter, Camborne School of Mines, UK; and Helsinki University of Technology, Finland) offers a specialisation in **Mineral engineering**.

Another specialisation within the EMMEP programme is Geotechnical and Environmental Engineering. In this specialisation, the University of Miskolc, who is a partner in the EUROMIN Consortium, is one of the participating institutions in the Joint programme.

3.3. Proposal for a EuroMaster in Mineral Sciences programme

The most significant outcome of the EUROMIN project was the design of a **Mineral Sciences Programme at Second Cycle level (Master)** that could be then used as a reference through all the European Higher Education Area (EHEA).

The Master Programme in Mineral Sciences is based on three major pillars, in the same manner as the whole EUROMIN project was build from the beginning:

- the vast personal didactic experience of the individual members in the EUROMIN Consortium
- the deep understanding and knowledge on the requirements of the Bologna Process
- the application of the Tuning methodology for designing and implementing a new degree programme

The EUROMIN Partnership tried to elucidate the fundamental underlying Generic and Subject Specific competences which are required for Mineral Sciences, as a framework for designing new programmes that are adapted to the local and national needs, based on the local infrastructure and staff. The programme was designed by using the Tuning methodology, *i.e.* the following items have been answered in the frame of the Bologna Reform:

- Degree profile
- Learning outcomes
- Competences
- Level
- Credits and workload
- Resources
- Monitoring
- Updating
- Sustainability and responsibility

As far as the curriculum is concerned, the Joint team of EUROMIN partner has evaluated the educational process, the educational products/outcomes, and the means and facility required.

One of the objectives of the EUROMIN project was also to map missing (in the standard curricula not-existing), but emerging and important courses and to outline their content. Some of these courses were already tested by the EUROMIN Consortium in the frame of the related (separately-financed) series of Erasmus Intensive Programmes (IP's) in Mineral Sciences that were implemented in 2006, 2007 and 2008:

IP2006: Technical mineralogy: silicate-based materials

IP2007: Asbestos

IP2008: Dioctahedral clay-related layer silicates

The newly proposed EuroMaster in Mineral Sciences has included these topics as components of the Alternative **Specialisation modules** (see below). Some of these subjects can be also included as research topics for the Master thesis.

The EuroMaster programme in Mineral Sciences will be first delivered in some of the EUROMIN partner institutions for testing, monitoring, maintenance and evaluation. The proposed programme will be first tested in Hungary, where four universities (Eötvös Loránd University, Budapest; Miskolc University; Pannon University, Veszprém and University of Szeged, the first three of them members of the EUROMIN Consortium) designed a joint four semester (120 ECTS) curriculum (EMMS-HU), fully compatible with the EuroMaster in Mineral Sciences recommendations. The programme has already been accepted for foundation by the Senates of the four universities, which gives a base for national accreditation of the Master programme, a pre-requisite for launching a future similar transnational action *e.g.* an ERASMUS MUNDUS programme. The feedback and feed forward inputs will lead to the programme quality enhancement.

A two-year structure with four main programme modules (each of 30 ECTS) was designed. The detailed structure of the programme is presented in the overview chart below.

The first, **Basic module** consists of an **Equalisation block** (12 ECTS) where specific courses are defined according to the BSc degree types. This block is dedicated to the homogenisation of the extremely various competences of students coming from different first cycle (BSc) lines (Earth sciences, Environmental sciences, Chemistry, Physics, Engineering, Cultural heritage, Forensic science etc.) as well as from different universities.

This block is followed by two **alternative “Difference blocks”** (18 ECTS):

Earth & Environmental Block – designed for the graduates of Physics, Chemistry, Material science and Engineering etc. First Cycle;

Physics and Chemistry Block – addressing the students coming from Geology, Earth science, Environmental science etc. First Cycle.

The second semester is dedicated to the compulsory **Core module** (10 ECTS each) consisting of the following three blocks (10 ECTS each):

Advanced theoretical background of Mineral Sciences

Advanced knowledge on Mineral Sciences-related materials

Analytical techniques of Mineral Sciences

The third semester contains several alternative **Specialisation modules** (30 ECTS), which concern: Experimental Mineral Sciences, Environmental Mineral Sciences, Industrial/Engineering Mineral Sciences, Advanced materials-related Mineral Sciences, Special analytical techniques, Theoretical and computational Mineral Sciences, Cultural heritage-related Mineral Sciences, Geology-Geophysics-related Mineral Sciences, Bio-, health/life-related Mineral Sciences. These modules will involve student and staff mobility, based on the local resources in each of the universities involved in the programme.

The **Thesis module** is dedicated to the Master thesis work (30 ECTS). The Master work could be performed in the home university, in other Higher Education institutions, or could involve workplace learning (placements in the industry etc.). The research topics will concern specific aspects of Mineral Sciences, for examples related to the missing, emerging subjects identified by the Erasmus IP's in Mineral Sciences programmes.

Each of the four universities will host modules of the Joint Master programme, based on their local resources, e.g.:

Theoretical and experimental Mineral Sciences: Eötvös L. University

Applied Mineral Sciences (Geological engineering and mining engineering): Miskolc University

Environmental-related Mineral Sciences: Pannon University, Veszprém

Geology-Geophysics-related Mineral Sciences: University of Szeged.

We strongly hope that the best practice of the Consortium would serve as starting point for Mineral Science-related Second Cycle programme designing throughout Europe and that it would give the proper tools for the implementation of such programmes. The EuroMaster degree could be assigned to any individual Second Cycle Programme in Mineral Sciences that fits this degree structure. The proposed EuroMaster provides not only a solid basis for key specific competences in Mineral Sciences at the Second Cycle level, but also a high degree of flexibility for each university to adapt it at its own local resources and student-oriented goals. The EuroMaster in Mineral Sciences programme represents the summary of good practice finally leading to the proper balance between the manifold aspects of Mineral Sciences, a coherent structure providing solid building blocks for Mineral Sciences-related Higher Education Institutions (HEI) in Europe.

EuroMaster in Mineral Sciences (MS)

Overview chart of the degree programme

Thesis module
(30 credits)

Thesis work

Alternative specialisation modules
(30 credits each)

Analytical techniques in MS

Environmental MS

Theoretical and computational MS

Advanced materials-related MS

Industrial / engineering MS

Cultural heritage-related MS

Experimental MS

Bio-, health / life-related MS

Geology / geophysics-related MS

Core module
(30 credits)

Analytical techniques of MS

diffraction methods, microscopies, spectroscopies, local and bulk applications etc.

Advanced knowledge of MS related materials

minerals, industrial raw materials (clay minerals, zeolites etc.), ceramics, slags, non-consolidated suspended materials, special environmental solids etc.

Advanced theoretical background of MS

e.g. solid state thermodynamics, kinetics of phase transformations etc.

Basic module
(30 credits;
containing
alternative blocks)

Earth and Environmental Sciences difference block

Physics and Chemistry difference block

Equalisation block

(according to the BSc degree types)

3.3. Relationship of Mineral Sciences with other second degree programmes

Mineral Sciences are traditional components of other Second Cycle degree programmes such as Geology/Geosciences, Earth Science, Environmental sciences, Material science, Chemistry, Physics, Civil engineering, Geography, Archaeology/Archaeometry etc. Due to recent changes in the society in the last decades, Mineral Sciences have developed new links to other sciences and applied sciences, and this is more and more visible also in the Master programmes of profiles distinctive from Mineral Sciences that include courses/modules in Mineral Sciences topics. Such examples include: Waste management, Natural risk assessment/Geological hazards, Forensic studies, Land planning.

A Mineral Science degree programme requires underpinning knowledge especially in the fields of Chemistry, Physics, Biology, Mathematics and Information Technology, some of which may properly constitute part of Earth Science curriculum. Mineral Science are also relevant to Law and Economics, Town and Country Planning, Human Geography, Politics and Sociology, and Management, Business and Safety studies. Students often receive instruction from outside the core department and may have an opportunity to gain joint degrees.

The typical ECTS contribution of Mineral Sciences in Geology Master programmes is between 10-30 ECTS with an average around 15 ECTS. In the case of Earth Sciences and Environmental Sciences, the average number is 10 ECTS, while in the other Master degree profiles there is an average of 5 ECTS Mineral Sciences courses.

Concerning the representation of the EUROMIN Partners in Second cycle programmes with profiles other than Mineral Sciences, but which include courses/modules in Mineral Sciences, the situation is as follows:

Master programmes in Geology/Geosciences (including Applied Geology) with courses/modules in Mineral Sciences:

- Belgium: Catholic University Leuven, Department of Geology
- Czech Republic: Charles University in Prague, Faculty of Science
- Czech Republic: Masaryk University Brno, Faculty of Science
- Finland: Oulu University, Faculty of Science
- France: University of Orleans, UFR Sciences
- Hungary: University of Miskolc, Faculty of Earth Sciences and Engineering
- Italy: Università degli studi di Pavia, Faculty of Mathematical, Physical and Natural Sciences
- Italy: Università degli studi di Pisa, Faculty of Mathematical, Physical and Natural Sciences
- Italy: Università degli studi di Torino, Faculty of Mathematical, Physical and Natural Sciences
- Poland: Jagiellonian University Krakow, Institute of Geological Sciences
- Portugal: University of Evora, Department of Geosciences
- Slovenia: University of Ljubljana, Faculty of Natural sciences and Engineering

Master programmes in Material Sciences with courses/modules in Mineral Sciences:

- Germany: Friedrich-Alexander-Universität Erlangen-Nürnberg, in collaboration with Elitenet Bayern
- Italy: Università degli studi di Torino, Faculty of Mathematical, Physical and Natural Sciences

Master programmes in Earth Sciences with courses/modules in Mineral Sciences:

- Austria: University of Vienna, Faculty for Geosciences, Geography and Astronomy
- Portugal: University of Evora, Department of Geosciences
- Switzerland: University of Fribourg, Faculty of Sciences

Master programmes in Environmental Science with courses/modules in Mineral Sciences:

- Bulgaria: Sofia University "St. Kliment Ohridski", Faculty of Geology and Geography
- Croatia: University of Zagreb, Faculty of Science
- Finland: Oulu University, Faculty of Science
- Hungary: Eötvös L. University Budapest, Faculty of Sciences

- Hungary: University of Miskolc, Faculty of Earth Sciences and Engineering
- Italy: Università degli studi di Torino, Faculty of Mathematical, Physical and Natural Sciences
- Romania: Babes-Bolyai University Cluj-Napoca, Faculty of Environmental Science
- Slovenia: University of Ljubljana
- Spain: University of Jaen, Faculty of Experimental Sciences
- Spain: University of Seville, Faculty of Chemistry

Master programmes in Geological/Mining engineering with courses/modules in Mineral Sciences:

- Hungary: University of Miskolc, Faculty of Earth Sciences and Engineering
- Portugal: University of Evora, Department of Geosciences
- Serbia: University of Belgrade, Faculty of Mining and Geology

Masters related to Cultural heritage with courses/modules in Mineral Sciences:

- Italy: Università degli studi di Torino, Faculty of Mathematical, Physical and Natural Sciences

4. Opening to third cycle programmes in Mineral Sciences

The situation of the Mineral sciences programmes at PhD level is very heterogeneous from country to country, and from university to university. In the same time, as far as the framework and key general competencies are concerned, they are similar to the Earth Sciences Third Cycle degrees.

In the cases when Third Cycle Mineral Sciences-related profiles are defined, they mainly refer to topics such as (in alphabet order, with the most Mineral Science-relevant topics in bold):

Earth Sciences

Environmental Sciences and technologies

Experimental mineralogy

Geobiology

Geodynamics

Geology

Geology and Mineralogy

Geochemistry

Geosciences

Geotechnics

Igneous, metamorphic and volcanic studies

Magmatic and Hydrothermal processes

Marine Sciences

Mineralogy and Mineral Physics

Mining Engineering

Nanoscience

Science and Technology of Materials

However, in the case of PhD by research, there is a wide range of individual topics that are connected to the local research projects of the PhD co-ordinators. In this way, the topics of the PhD studies reflect the research priorities that are acknowledged at European level. Funding comes from a variety of sources either from European programmes, National Research Bodies and Academies, the Universities, industry or the students themselves. Industry has a good tradition of supporting Third Cycle research and training in Mineral Sciences, however, such funding is strongly influenced by commodity prices, as is recruitment. At times of high commodity prices funding is available but students are not, as they enter the work place often with First Cycle degrees. At times of low commodity prices the opposite is true. The lack of strong, trans-European public-private funding structures must also influence our global competitiveness as our economic competitors are seeking to recruit proportionately more European First or Second Cycle students to their Doctoral Programmes. EUROMIN agrees with the comment of the Tuning Earth Science Subject Area Group (ESSAG) that that Third Cycle studies are under-funded and would benefit from more European, national and industrial support. A recent survey showed that Earth Science and related disciplines (including Mineral Sciences) produce some 8% of European Doctorates (Lola, 2004).

Many of the EUROMIN partner institutions run Ph.D. (Research) based 3rd Cycle programmes. Admission to these programmes is usually after a Cycle 2 degree and may also involve an entrance exam. The 3rd Cycle degree is completed in between 3 to 5 years with a median value at about 3.5 years. Longer completion dates may reflect the fact that the student is funded by a teaching fellowship, which in effect makes the degree part-time. In the case when Graduate PhD Schools were created, they offer a curriculum based on credits, ranging between 180-240 ECTS. Some of the EUROMIN partner institutions have implemented such Doctoral schools: Eötvös L. University, Budapest and Babeş-Bolyai University in Cluj-Napoca, among others.

It was beyond the goals and objective of the EUROMIN project to address Third Cycle degree programmes. However, during the work for the project outcomes, connections to both First, and Third Cycle have identified and solutions have been proposed. However, standards must be maintained, and any Doctorate must have a significant research component. The assessment should be based on

a body of research described in a thesis and, or publications. Some systems may use internal credits to monitor progress. ECTS should be limited and preferably only used in a very limited and appropriate manner.

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5. References and resources

References:

Lola, M. (2005). Doctoral Programmes for the European Knowledge Society, Bologna Seminar, Salzburg, February 2004).

Norbury, D. (2004). Current Issues Relating to the Professional Practice of Engineering Geology in Europe. *Lecture Notes in Earth Science, Springer Berlin / Heidelberg, 104*, 15-30.

Internet Resources:

Sorbonne Joint Declaration on harmonisation of the architecture of the European higher education system (1998)

http://www.bologna-berlin2003.de/pdf/Sorbonne_declaration.pdf

The Bologna Declaration (1999)

<http://ec.europa.eu/education/policies/educ/bologna/bologna.pdf>

Prague Communiqué :Towards The European Higher Education Area (2001)

http://www.bologna-bergen2005.no/Docs/00-Main_doc/010519PRAGUE_COMMUNIQUE.PDF

Berlin Communiqué (2003)

<http://www.bologna-berlin2003.de/en/aktuell/haupt.htm>

Bergen Bologna follow-up (2005)

http://www.bologna-bergen2005.no/Docs/00-Main_doc/050520_Bergen_Communique.pdf

The Tuning Glossary:

<http://tuning.unideusto.org/tuningeu/images/stories/GLOSSARY.pdf>

The main Tuning website (containing all the Tuning III documents, and Tuning I & Tuning II publications in pdf format):

<http://tuning.unideusto.org/tuningeu/>

(and many others indicated in the text or in the annexes)

Annex 1: Directory of members of the EUROMIN Consortium

Partners of the EUROMIN project

- The consortium partners of the EUROMIN project are 29 institutions from 19 Socrates countries, Switzerland and 3 Tempus countries.
- Co-ordinating institution is the Eötvös Loránd University, Budapest, Hungary.
- Below follows the list of the consortium partners (with Erasmus codes) and their representatives (with asterisk* the contact persons).



AUSTRIA



University of Vienna

A WIEN01

Effenberger, Herta* Professor [Dept. of Mineralogy and Crystallography](#)

Tillmanns, Ekkehart Professor [Dept. of Mineralogy and Crystallography](#)

University of Salzburg – OBSERVER

A SALZBUR01

Hoeck, Volker* Professor [Dept. of Geography, Geology and Mineralogy](#)

BELGIUM



Catholic University Leuven

B LEUVEN01

Elsen, Jan* Assist. Prof. [Dept. of Geography and Geology](#)

BULGARIA



Sofia University "St. Kliment Ohridsky"

BG SOFIA06

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CROATIA



University of Zagreb

Tibljaš, Darko* Professor Dept. of Geology

CZECH REPUBLIC



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SF OULU01

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F PARIS006

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G THESSAL01

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HU BUDAPES01

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Szakáll, Sándor* Assoc. Prof. [Dept. of Mineralogy and Petrology](#)Madai, Ferenc Lecturer [Dept. of Mineralogy and Petrology](#)**University of Veszprem**

HU VESZPRE01

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IRL GALWAY01

Moore, Kathryn* Lecturer [Dept. of Earth and Ocean Sciences](#)Baxter, Sadhbh Dr. [Dept. of Earth and Ocean Sciences](#)

ITALY**University of Pavia**

I PAVIA01

Vannucci, Riccardo* Professor [Dept. of Earth Sciences](#)**University of Pisa**

I PISA01

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I TORINO01

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Annex 2: EUROMIN Questionnaire 1

	Institution¹	
	Bologna system introduced: from the zero, with new degree programmes (0), or by assimilating the old system (1)	
	Type of accreditation procedure for 1st cycle	
1st cycle	Type of 1st cycle programme ²	
	Acad. year for starting with the 1st cycle	
	Total no. of semesters for the 1st cycle	
	Of which, no. of semesters for specialization/professional orientation	
	No. of registered students (approx.)	
	Total no. of credits (ECTS) / 1st cycle	
	No. of common, compulsory (Core) credits (ECTS)	
	No. of credits (ECTS)/cycle allocated to (broad-sense) MS* courses	
	No. of credits (ECTS)/cycle allocated to (broad-sense) MPCB** courses	
	No. of credits (ECTS)/cycle allocated to (broad-sense) ES*** courses	
	No. of credits (ECTS)/cycle allocated to (broad-sense) other courses	
	Types of specializations in the last part of 1st cycle (no. of semesters?)	
	Field work: no of credits. Is it included in the common credits?	
	BSc Thesis: no. of credits. Is it included in the common credits?	
Title for the 1st cycle Degree (Diploma); is the specialization mentioned?		
	Type of accreditation procedure for 2nd cycle	
	Is there a selection procedure between 1st and 2nd cycle? Which?	
	No. of "specific" credits (ECTS) needed for entering 2nd cycle	
2nd cycle	Type of 2nd cycle programme ²	
	Acad. year for starting with the 2nd cycle	
	No. of semesters for the 2nd cycle	
	Title for the 2nd cycle Degree (Diploma); is the specialization mentioned?	
	Is the programme free of charge?	
	No. of registered students (approx.)	
	Total no. of credits (ECTS) / 2nd cycle	
	No. of credits (ECTS)/cycle allocated to (broad-sense) MS* courses	
	No. of credits (ECTS)/cycle allocated to (broad-sense) MPCB** courses	
	No. of credits (ECTS)/cycle allocated to (broad-sense) ES*** courses	
	No. of credits (ECTS)/cycle allocated to (broad-sense) other courses	
Types of specializations in the last part of 2nd cycle (no. of semesters?)		
Title for the 2nd cycle Degree (Diploma)		
	Type of accreditation procedure for 3rd cycle	
	Is there a selection procedure between 2nd and 3rd cycle? Which?	
	No. of "specific" credits (ECTS) needed for entering 3rd cycle	
3rd cycle	Type of 3rd cycle programme ²	
	No. of semesters for the 3rd cycle	
	Acad. year for starting with the 3rd cycle	
	Title for the 3rd cycle Degree (Diploma)	
	Is the programme free of charge?	
	No. of registered students (approx.)	
other 1st cycle program mes where MS are taught ¹	Cultural Heritage (no. credits for MS subjects)	
	Medicine (Forensics etc.) (no. credits for MS subjects)	
	Agronomy (no. credits for MS subjects)	
	Others (no. credits for MS subjects)	
other 2nd cycle program mes where MS are taught ¹	Cultural Heritage (no. credits for MS subjects)	
	Medicine (Forensics etc.) (no. credits for MS subjects)	
	Agronomy (no. credits for MS subjects)	
	Others (no. credits for MS subjects)	

1=for your home university but include also other universities in your country, if possible

2=basic types of programmes (study lines): [MinerSci], [Geol], [GeoSci], [EarthSci], [EnvirSci], [MatSci&Eng],

other?; use one column for each programme, if several

*MS=Crystallography, Mineralogy, Petrology, Geochemistry and related subjects

**MPCB=Mathematics, Physics, Chemistry, Biology and related subjects

***ES=Geology, Paleontology, Stratigraphy, Tectonics, Structural Geology, Geophysics and related subjects

Annex 3: EUROMIN Questionnaire 2

STUDY (June 2007)

1. Presentation of the current 2nd cycle Mineral Sciences-related curricula (topics, no. of teaching hours, ECTS) in your institution (English version, if any, or in the native language), including your department's curriculum-related website address;

2. List of higher education institutions in your country issuing 2nd cycle degrees in Mineral Sciences (and/or other study lines containing a strong Mineral Science-related component);

3. Practical examples of Mineral Sciences courses taught to other non-geological study lines you are aware of, in your university or in other universities;

4. Typical jobs/employers addressing the graduates of the 2nd cycle in Mineral Sciences (or Mineral Sciences-related) study lines in your country or in Europe, in general.

Annex 4: EUROMIN Questionnaire 3

- STUDY (January 2008)

University name (please fill in): max. 500 characters, incl. numbers

1. In which academic year did your department start with a Bologna-type Bachelor (First cycle) Degree?
max. 200 characters, incl. numbers

2. Which is the title (name) of the current Bologna-type Bachelor Degree offered by your department?
(please select one or more of the options below)

- Earth Sciences
- Geology
- Mineralogy
- Environmental Sciences
- Other (specify) max. 500 characters, incl. numbers

3. Is there specialization towards Mineral Sciences offered within the Bachelor programme? Yes / No

If yes, which is its title (name)? max. 200 characters, incl. numbers

From which semester of the Bachelor Programme is that specialization offered?

max. 200 characters, incl. numbers

4. In which academic year did/will your department start with a Bologna-type Master (Second cycle) Degree? max. 200 characters, incl. numbers

5. What is the title of the most Mineral Sciences-related Bologna-type Master Degree offered by your department? (please select one or more of the options below)

- Mineralogy
- Applied Mineralogy
- Geology with Mineral Sciences module
- Environmental Science with Mineral Sciences module
- Material Sciences
- Engineering
- Others (specify) max. 500 characters, incl. numbers

Annex 5: Directory of Higher Education Institutions (HEI) in Europe providing Mineral Sciences (MS)-related 2nd cycle (Master) programmes

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
BG	Sofia University "St. Kliment Ohridski", Faculty of Geology and Geography	Geochemistry	MS	3	M.Sc.	none
BG	Sofia University "St. Kliment Ohridski", Faculty of Geology and Geography	Gemmology	AMS	3	M.Sc.	none
CH	University of Bern, Institute of Geological Sciences	Environmental and Resource geochemistry	AMS	4	M.Sc.	none
DE	Ruhr-University Bochum, Faculty of Geosciences	Crystallography	MS	3	Master	none
DE	Ruhr-University Bochum, Faculty of Geosciences	Petrology	MS	3	Master	none
DE	Freie Universität Berlin, Institute for Geological Sciences	Mineralogy / Petrology	MS		M.Sc.	none
DE	Freie Universität Berlin, Institute for Geological Sciences	Geochemistry	MS		M.Sc.	none
DE	University of Leipzig, Faculty of Chemistry and Mineralogy	Mineralogy and Material Science	AMS	4	M.Sc.	none
DE	Technical University + Ludwig-Maximilians University Munchen	Geomaterials and geochemistry	AMS	4	M.Sc.	none
HU	Eötvös L. University Budapest + Miskolc University + Pannon University Veszprém + University of Szeged	Mineralogy (Joint programme)	MS	4	M.Sc.	none
IE	National University of Ireland, Galway, Department of Earth and Ocean Sciences	Gemmology	AMS	4	Master by research	none
IT	University of Messina, Faculty of Mathematics, Physics and Natural Sciences	Environmental mineralogy	AMS / ES		Laurea magistrale (2nd degree)	none
IT	University of Messina, Faculty of Mathematics, Physics and Natural Sciences	Mineralogy applied to cultural heritage	AMS / CH		Laurea magistrale (2nd degree)	none
IT	Università degli studi di Torino, Faculty of Mathematical, Physical and Natural Sciences	Clinical, forensic and sports chemistry	AMS	4	Laurea magistrale	none
NL	Utrecht University, Faculty of Geosciences	Geochemistry	MS	4	M.Sc.	none
NO	University of Stockholm, Department of Geology and geochemistry	Geochemistry	MS	4	M.Sc.	none
PL	Warsaw University, Faculty of Geology	Geochemistry, mineralogy and petrology	MS	10	Master (1st degree)	none
RO	University of Bucharest, Faculty of Geology and Geophysics	Petrology and Metallogeny	MS	4	M.Sc.	none
RO	Babes-Bolyai University Cluj-Napoca, Faculty of Biology and Geology	Applied Mineralogy and Petrology	AMS	4	M.Sc.	none
SK	Comenius University in Bratislava, Faculty of Natural Sciences	Geochemistry	MS	4	M.gr.	none
SK	Comenius University in Bratislava, Faculty of Natural Sciences	Mineralogy and Petrology	MS	4	M.gr.	none
SK	Comenius University in Bratislava, Faculty of Natural Sciences	Economic geology	MS	4	M.gr.	none

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
SK	Comenius University in Bratislava, Faculty of Natural Sciences	Geology of Mineral deposit	AMS / ES	4	M.Sc.	none
SK	Comenius University in Bratislava, Faculty of Natural Sciences	Environmental Geochemistry	AMS / AES	4	M.gr.	none
SRB	University of Belgrade, Faculty of Mining and Geology	Mineralogy and Crystallography	MS	4	M.Sc.	none
SRB	University of Belgrade, Faculty of Mining and Geology	Petrology and Geochemistry	MS	4	M.Sc.	none
SRB	University of Belgrade, Faculty of Mining and Geology	Economic Geology	MS	4	M.Sc.	none
TR	University of Istanbul, Faculty of Science	Mineralogy and Petrology	MS	2	Master by research	none
TR	University of Istanbul, Faculty of Science	Ore deposits-Geochemistry	MS	2	Master by research	none
UK	University of Leeds, School of Earth and Environment	Geochemistry	MS	3	M.Sc.	none
UK	Imperial College London, Department Earth Science and Engineering & Business School	Metals and Energy Finance	AMS / AGS	2	M.Sc.	none
UK	University of Leeds, School of Earth and Environment	Environmental Geochemistry	AMS	3	M.Sc.	none
BE	Université Libre de Bruxelles, Faculty of Sciences	Geological Sciences	GS	4	M.Sc.	Geochemistry
BE	Catholic University Leuven, Department of Geology	Geology	AGS / AMS	4	M.Sc.	Applied Geology and Mineralogy
CH	Swiss Federal Institute of Technology Zurich (ETH), Department of Earth Sciences	Earth Sciences	GS / MS	2-3	M.Sc.	Geology and geochemistry
CH	ELSTE: University of Geneva, Faculty of Sciences +University of Lausanne, Faculty of Geosciences and the Environment	Geology	GS / MS	4	M.Sc.	Petrology, Geochemistry, and Ore Deposits
CZ	Charles University in Prague, Faculty of Science	Geology	GS	4	M.Sc.	Mineralogy
DE	Goethe University Frankfurt am Main, Institute of Geosciences	Geosciences	GS	4	M.Sc.	Mineralogy
ES	University of Barcelona, Faculty of Geology	Geology	GS / AMS	2	M.Sc.	Geological materials and mineral resources
ES	Complutense University Madrid, Faculty of Geological Sciences	Environmental Geology and Geological Resources	AGS / MS	3	M.Sc.	Mineral resources and environment
FI + SE	Oulu University + Lulea Technical University	Geology and Mineralogy	AGS	4	M.Sc.	Mining and exploration
FR	University of Orleans, UFR Sciences	Geosciences and the Environment	AGS / AMS	4	Master Science and Research	Mineral resources and lithospheric transfer
FR	Ecole des Mines Paris + Univ. Paris 6, Cergy, ENS Ulm	Geoenvironment	AGS	2+1	Master by research	Geosciences and geomaterials
GR	Aristotle University of Thessaloniki, Faculty of Science	Geology and geoenvironment	AGS / MS	3	M.Sc.	Petrology - Geochemistry
HR	University of Zagreb, Faculty of Science	Geology	MS	4	M.Sc.	Mineralogy and petrology

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
HU	Eötvös L. University Budapest, Faculty of Sciences	Geology	GS	4	M.Sc.	Mineralogy-Geochemistry-Mineral resources-Archeometry
IT	Università degli studi di Pisa, Faculty of Mathematical, Physical and Natural Sciences	Geological Sciences	AMS / GS	4	Laurea specialistica	Geological materials and georesources
NO	Norwegian University of Science and Technology Trondheim, Faculty of Engineering Science and Technology	Natural Resources Management	AGS	4	M.Sc.	Resource geology
RU	Lomonosov Moscow State University, Faculty of Geology	Geology	MS / GS	4	M.Sc.	Mineralogy
RU	Lomonosov Moscow State University, Faculty of Geology	Geology	MS / GS	4	M.Sc.	Gemmology
AT	University of Vienna, Faculty for Geosciences, Geography and Astronomy	Earth Sciences	EarthS / MS / MatS	4	M.Sc.	Mineralogy-Crystallography, Materials and Raw materials research
AT	University of Vienna, Faculty for Geosciences, Geography and Astronomy	Earth Sciences	EarthS / AMS	4	M.Sc.	Petrology, resources and applications
AT	University of Vienna, Faculty for Geosciences, Geography and Astronomy	Earth Sciences	EarthS / AMS	4	M.Sc.	Geochemistry
NL	Delft University of Technology	Applied Earth Sciences	AEarthS	4	M.Sc.	Track: Resource engineering; Specialisation: Mineral engineering (EMMEP)
HU	University of Pannonia Veszprem, Faculty of Engineering	Environmental Sciences	ES / AMS	4	M.Sc.	Atmospheric studies; Limnological studies (inc. AMS)
European Master	Wroclaw University of Technology + Rheinisch-Westfaelische Technische Hochschule Aachen + University of Exeter, Camborne School of Mines + Helsinki University of Technology	Erasmus Mundus Minerals and Environmental Programme (EMMEP)	AMS / AEng / AES	4	M.Sc.	Mineral engineering
DE	RWTH Aachen University, Geological Institute	Materials Science	MatS	2-4	M.Sc.	none
DE	Friedrich-Alexander-Universität Erlangen-Nürnberg + Elitenet Bayern	Advanced Materials and Processes (Elite master)	AMatS	4	M.Sc.	
DK	Aarhus University, Faculty of Science	Material physics-chemistry	MatS	4	M.Sc.	none
DK	Aarhus University, Faculty of Science	Nanoscience	AMatS	4	M.Sc.	
FR	University Pierre et Marie Curie Paris 6	Physics and its applications	AMatS / AMS	4	M.Sc.	Earth and Universe Sciences / Physics of the Solid Earth
IT	Università degli studi di Torino, Faculty of Mathematical, Physical and Natural Sciences	Material sciences	MatS	4	Laurea magistrale	none

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
AT	Paris Lodron-Universität Salzburg, Faculty of Natural Sciences	Geology	GS	4	M.Sc.	none
AT	Montanistic University Leoben, Department of Applied Geosciences and Geophysics	Applied Geosciences	AGS		Master	Raw materials and environmental geology
BE	University of Liege, Faculty of Sciences	Geological Sciences	GS	2	M.Sc.	none
BE	University of Liege, Faculty of Sciences	Geological Sciences	GS	4	M.Sc.	none
BE	Université Libre de Bruxelles, Faculty of Sciences	Geological Sciences	GS	4	M.Sc.	Environment
BE	Ghent University	Geology	GS	4	M.Sc.	
BE	Catholic University Leuven, Department of Geology	Geology	GS	4	M.Sc.	Geodynamics and geofluids
BE	Ghent University	Geotechnics	AGS	4	M.Sc.	none
BE	Catholic University Leuven, Department of Geology	Geology	AGS	4	M.Sc.	Biogeology
BY	Belarusian State University Mins, Faculty of Geography	Geology	GS	2	M.Sc.	none
CH	University of Bern, Institute of Geological Sciences	Geology	GS	4	M.Sc.	none
CH	Swiss Federal Institute of Technology Zurich (ETH) + University of Zurich	Earth Sciences	GS	2-3	M.Sc.	Geoscience
CH	ELSTE: University of Geneva, Faculty of Sciences +University of Lausanne, Faculty of Geosciences and the Environment	Geology	GS	4	M.Sc.	Sedimentary Geology
CH	ELSTE: University of Geneva, Faculty of Sciences +University of Lausanne, Faculty of Geosciences and the Environment	Geology	GS	4	M.Sc.	Structural and Alpine Geology
CH	ELSTE: University of Geneva, Faculty of Sciences +University of Lausanne, Faculty of Geosciences and the Environment	Geology	AGS / AES	4	M.Sc.	Environmental Geology and Geological Risks
CH	University of Bern, Institute of Geological Sciences	Earth materials	AGS	4	M.Sc.	none
CZ	Masaryk University Brno, Faculty of Science	Geology	GS	4	M.gr.	Geology
CZ	Masaryk University Brno, Faculty of Science	Geology	AGS + MS	4	M.gr.	Geology, hydrogeology and geochemistry
CZ	Masaryk University Brno, Faculty of Science	Geology	AGS / CH	4	M.gr.	Geology combined with Archeology
CZ	Masaryk University Brno, Faculty of Science	Geology	AGS	4	M.gr.	Upper Secondary School Teacher Training in Geology
CZ	Charles University in Prague, Faculty of Science	Applied geology	AGS	4	M.Sc.	none
CZ	Charles University in Prague, Faculty of Science	Teaching of geology for Secondary Schools (one subject)	AGS	4	M.Sc.	none
DE	Westfälischen Wilhelms-Universität Münster	Geosciences	GS	4	M.Sc.	none
DE	University of Bremen, Department of Geosciences	Geosciences	GS	4	M.Sc.	none

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
DE	Technical University + Ludwig-Maximilians University Munchen	Geological Sciences	GS	4	M.Sc.	none
DE	Ruhr-University Bochum, Faculty of Geosciences	Endogeneous Geology	GS	3		none
DE	Leopold-Franzens-University Innsbruck, Faculty of Geo- and Atmospheric Sciences	Geosciences	GS	4	M.Sc.	none
DE	Goethe University Frankfurt am Main, Institute of Geosciences	Geosciences	GS	4	M.Sc.	Geology-Paleontology; Geophysics
DE	Georg-August-University Gottingen, Faculty of Geosciences and Geography	Geosciences	GS	4	M.Sc.	none
DE	Freie Universität Berlin, Institute for Geological Sciences	Geology	GS		M.Sc.	none
DE	Christian-Albrechts University Kiel, Institute of Geosciences	Geosciences	GS	4	M.Sc.	none
DE	Bonn University, Faculty of Mathematics and Natural Sciences	Geosciences	GS	4	M.Sc.	none
DE	University of Koln, Faculty of Mathematics and Natural Sciences	Quaternary Science and Geoarchaeology	AGS / CH	4	M.Sc.	none
DE	University of Bremen, Department of Geosciences	Marine Geosciences	AGS	4	M.Sc.	none
DE	University Karlsruhe, Institute of Mineralogy and Geochemistry	Applied Geosciences	AGS		M.Sc.	none
DE	Technical University Darmstadt	Applied Geosciences (TropHEE)	AGS	4	M.Sc.	none
DE	Technical University Berlin, Institute of Applied Geosciences	Geotechnology	AGS	4	M.Sc.	none
DE	Ruhr-University Bochum, Faculty of Geosciences	Applied Geology	AGS	3		none
DE	Christian-Albrechts University Kiel, Institute of Geosciences	Marine geosciences	AGS	4	M.Sc.	none
DK	Copenhagen University, Institute of Geology	Geology	GS	4	M.Sc.	none
DK	Aarhus University, Faculty of Science	Geology	GS	4	M.Sc.	none
DK	Aarhus University, Faculty of Science	Technical Geology	GS	4	Graduate engineer	none
EE	University of Tartu, Faculty of Science and Technology	Geology	GS	4	M.Sc.	none
ES	University of Granada, Andalusian Institute for Earth Sciences	Geology	GS	4	M.Sc.	none
ES	University of Barcelona, Faculty of Geology	Geology	GS	2	M.Sc.	General
ES	University of Barcelona, Faculty of Geology	Geology	GS	2	M.Sc.	Geology and exploration of sedimentary basins
ES	University of Barcelona, Faculty of Geology	Geology	GS	2	M.Sc.	Geological risks
ES	Universitat Autònoma de Barcelona, Faculty of Sciences	Geology	GS	4	Master	none
ES	Complutense University Madrid, Faculty of Geological Sciences	Environmental Geology and Geological Resources	AGS / GS	3	M.Sc.	Processes and dynamics of lithosphere
ES	Complutense University Madrid, Faculty of Geological Sciences	Environmental Geology and Geological Resources	AGS / ES	3	M.Sc.	Hydrogeology and soils

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
ES	Complutense University Madrid, Faculty of Geological Sciences	Environmental Geology and Geological Resources	AGS	3	M.Sc.	Geological risks and land planning
ES	University of Zaragoza, Faculty of Sciences	Initiation in geological investigations	AGS	2	M.Sc.	none
ES	University of Oviedo, Faculty of Geology	Geological resources and geotechnics	AGS	3	M.Sc.	none
ES	Complutense University Madrid, Faculty of Geological Sciences	Environmental Geology and Geological Resources	AGS	3	M.Sc.	Sedimentary basins and energy resources
FI	Oulu University, Faculty of Science	Geology	GS	4	M.Sc.	none
FR	University Paris-Sud 11, Faculty of Sciences in Orsay	Sedimentary and volcanic environments	GS	2	Master by research (M2)	none
FR	University of Montpellier, Faculty of Sciences	Geosciences	GS	4	M.Sc.	Geo-risks
FR	University of Montpellier, Faculty of Sciences	Geosciences	GS	4	M.Sc.	Geodynamics
FR	University of Montpellier, Faculty of Sciences	Geosciences	GS	4	M.Sc.	Geological reservoirs
FR	University of Bourgogne, UFR Environmental and Earth Sciences	Archeosciences and geoenvironnement	AGS / CH	4	M.Sc.	none
FR	University Paris-Sud 11, Faculty of Sciences in Orsay	Geology and environment	AGS / AES	2	Master by research (M2)	none
FR	University of Strasbourg, Ecole et Observatoire des Sciences de la Terre + Université de Haute-Alsace	Geosciences, environment, risks	AGS / AES	4	Master by research	Environmental Geosciences
FR	Ecole des Mines Paris + Univ. Paris 6, Paris 7, Paris 10, ENS Ulm, Muséum, AGRO ParisTech, ENS Géo	Geoenvironment	AGS / AES	2+1	Master by research	Continental environments and hydrological sciences
FR	Ecole des mines Paris + Univ. Marne-la-Vallée	Geoenvironment	AGS / AES	2+1	Master by research	Geomaterials and environnement
FR	Ecole des Mines Paris + Univ. Marne-la-Vallée	Geoenvironment	AGS / AES	2+1	Master by research	Geological risks and environmental informations
FR	University of Strasbourg, Faculty of Geography and Land planning	Geosciences, environment, risks	AGS / AEng	4	M.Sc.	Technological and Natural Risks
FR	Ecole et Observatoire des Sciences de la Terre Strasbourg	Geosciences, environment, risks	AGS / AEarthS	4	Master by research	Earth Sciences
FR	University Paris-Sud 11, Faculty of Sciences in Orsay	Hydrology, hydrogeology and soils	AGS	2	Master by research (M2)	none
FR	University of Orleans, UFR Sciences	Geosciences and the Environment	AGS	4	Master Science and Research	Continental geosystems and geomathics
FR	University Joseph Fourier Grenoble, Observatoire des sciences de la Terre	Geosciences: Resources and Risks	AGS		M.S.c	none
FR	University Francois Rablais Tours	Geo-transfers	AGS	4	Master by research	none
FR	Université Bordeaux 1, Sciences Technologiques	Georesources	AGS	4	M.Sc.	none
GR	Aristotle University of Thessaloniki, Faculty of Science	Geology and environment	AGS / AES	3	M.Sc.	Natural resources - Environment

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
GR	National & Kapodistrian University of Athens, Faculty of Geology and Geo-Environment	Applied Environmental Geology	AGS	4	M.Sc.	none
GR	National & Kapodistrian University of Athens, Faculty of Geology and Geo-Environment	Dynamic Tectonic and Applied Geology	AGS	4	M.Sc.	none
HR	University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering	Geology of ore deposits and geophysical investigations	GS /AMS	4	M.Sc.	none
HR	University of Zagreb, Faculty of Science	Geology	AGS / ES	4	M.Sc.	Environmental geology
HU	University of Miskolc, Faculty of Earth Sciences and Engineering	Geosciences	GS		M.Sc.	none
IT	Università degli studi di Napoli Federico II, Department of Geological Sciences	Geology and applied geology	GS / AGS	2	M.Sc.	
IT	University of Modena and Reggio Emilia, Faculty of mathematics, Physics and Natural Sciences	Geological Sciences	GS	4	Laurea magistrale	none
IT	Università degli studi di Torino, Faculty of Mathematical, Physical and Natural Sciences	Geological Sciences	GS	4	Laurea magistrale	none
IT	Università degli studi di Pisa, Faculty of Mathematical, Physical and Natural Sciences	Geological Sciences	GS	5	Laurea specialistica	Dynamic and environmental geology
IT	Università degli studi di Parma, Faculty of Mathematical, Physical and Natural Sciences	Geological Sciences	GS	4	Laurea magistrale	Geomorphological dynamics and slope stability
IT	Università degli studi di Parma, Faculty of Mathematical, physical and natural Sciences	Geological Sciences	GS	4	Laurea magistrale	Sedimentary geology
IT	University of Perugia, Faculty of Mathematical, Physical and Natural Sciences	Geological resources and risks	AGS / AES / CH	4	Laurea specialistica	Geotechnology and geomaterials: risks, resources and cultural heritage
IT	Università degli studi di Torino, Faculty of Mathematical, Physical and Natural Sciences	Applied and environmental geology	AGS / AES	4	Laurea magistrale	none
IT	Università degli studi di Roma "La Sapienza", Faculty of Mathematical, Physical and Natural Sciences	[Geology applied to Engineering and Territorial Planning]	AGS / AEEng	4	Laurea specialistica	none
IT	University degli studi di Urbino "Carlo Bo", Faculty of Science and Technology	Geological sciences applied to buildings and territory	AGS	2	Laurea specialistica	none
IT	University of Perugia, Faculty of Mathematical, Physical and Natural Sciences	Geological resources and risks	AGS	4	Laurea specialistica	Geology of oil and seismic risks
IT	University of Padova, Faculty of Mathematical, Physical and Natural Sciences	Geology and technical geology	AGS	4	Laurea magistrale	Technical geology
IT	University of Catania, Faculty of Mathematics, Physics and Natural Sciences	Geological Sciences applied to the territory and to its resources	AGS	4	Laurea magistrale	none
IT	University of Bologna, Faculty of Mathematics, Physics and Natural Sciences	Geology and territory	AGS	4	Laurea magistrale	none

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
IT	University of Bologna, Faculty of Mathematics, Physics and Natural Sciences	Applied Geosciences	AGS	with sem. 3	Laurea magistrale	none
IT	Università degli studi Roma Tre, Faculty of Mathematical, Physical and Natural Sciences	Geology (the Territory and its Resources)	AGS		Master (2nd cycle)	none
IT	Università degli studi di Roma "La Sapienza", Faculty of Mathematical, Physical and Natural Sciences	Georesources	AGS	4	Laurea specialistica	none
IT	Università degli studi di Roma "La Sapienza", Faculty of Mathematical, Physical and Natural Sciences	Geophysical dynamics and volcanology	AGS	4	Laurea specialistica	none
IT	Università degli studi di Pavia, Faculty of Mathematical, Physical and Natural Sciences	Applied geological studies	AGS	2	Laurea magistrale	none
IT	Università degli Studi di Milano, Department of Earth Sciences	Geology: processes, resources and applications	AGS	10	Laurea magistrale (2nd degree)	none
IT	Università degli Studi di Firenze, Department of Earth Science	Georesources and environment	AGS	4	Laurea magistrale	none
LT	Vilnius University, Faculty of Natural Sciences	Geology	GS	4	M.Sc.	none
NL	Utrecht University, Faculty of Geosciences	Geology	GS	4	M.Sc.	none
NL	VU Amsterdam, Faculty of Earth and Life Sciences	Geosciences of Basins and Lithosphere	AGS	6	M.Sc.	none
NO	University of Oslo, Department of Geosciences	Geosciences	GS / AES	4	M.Sc.	Environmental Geology and Geohazards
NO	University of Stockholm, Department of Geology and geochemistry	Geology	GS	4	M.Sc.	none
NO	University of Oslo, Department of Geosciences	Geosciences	GS	4	M.Sc.	Geology
PL	Jagiellonian University Krakow, Institute of Geological Sciences	Geology	GS	4	M.Sc.	none
PL	Adam Mickiewicz University Poznan, Department of Geomorphology	Geology	GS	3	M.Sc.	none
PL	AGH University of Science and Technology	Mining and Geology	AGS	4	M.Sc.	none
PT	University of Coimbra, Faculty of Sciences and Technology	Geosciences	GS / AGS	4	M.Sc.	Petroleum Geology
PT	University of Coimbra, Faculty of Sciences and Technology	Geosciences	GS / AGS	4	M.Sc.	Operational geology
PT	University of Porto, Faculty of Sciences	Geomaterials and geological resources	AGS	5	M.Sc.	none
PT	University of Minho, Earth Sciences Department	Management and Valorisation of Geological Resources	AGS	4	M.Sc.	none
PT	University of Evora, Department of Geosciences	Geological mapping	AGS		M.Sc.	none
PT	University of Azores, Department of Geosciences, Ponta Delgada	Volcanology and geological risks	AGS	4	M.Sc.	none
PT	University of Aveiro, Department of Geosciences	Geomaterials and Geological resources	AGS	4	M.Sc.	none
SE	University of Gothenburg, Department of Earth Sciences	Geology	GS		M.Sc.	none

Cou ntry	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Durat ion full-time (sem)	Degree awarded	Specialization
SE	Lund University, Geobiosphere Science Centre	Geology	GS	4	M.Sc.	none
SI	University of Ljubljana, Faculty of Natural sciences and Engineering	Geology	GS	4	M.Sc.	none
SK	Comenius University in Bratislava, Faculty of Natural Sciences	Environmental Geology	AGS / AES	4	M.gr.	none
UK	University of Glasgow, Centre for Geosciences	Geosciences	GS	2	M.Sc./M.Res.	Earth Surface and Near-Surface Processes and Geochronology
UK	University College London, Birbeck School of Earth Sciences	Geology	GS	2	Graduate Certificate (with Distance learning option)	none
UK	Royal Holloway, University of London, Department of Earth Sciences	Geology	GS	2	M.Res.	none
UK	Keele University, School of Physical and Geographical Sciences	Geoscience	GS	8	Master (1st degree, undergraduate)	none
UK	University of Brighton, School of environment and technology	Coastal Zone Management	AGS / AES	2	M.Sc.	none
UK	University of Exeter, Camborne School of Mines	Mining Geology	AGS	2	M.Sc.	none
UK	University of Brighton, School of environment and technology	Applied Geology (Geoframeworks)	AGS	2	M.Sc.	none
UK	University of Aberdeen	Integrated petroleum geoscience	AGS	2	MSc in Integrated Petroleum Geoscience	none
UK	University College London, Birbeck School of Earth Sciences	Geological Field Techniques	AGS	4	Graduate Certificate (with Distance learning option)	none
UK	The University of Edinburgh, School of Geosciences + University of Newcastle Upon Tyne	Geoscience for Subsurface Exploration, Appraisal and Development (GeoSEAD)	AGS	2	M.Sc.	none
UK	Cardiff University, School of Earth and Ocean Sciences	Applied Environmental Geology	AGS	2	M.Sc.	none
BG	Sofia University "St. Kliment Ohridski", Faculty of Geology and Geography	Environmental sciences	ES	3	M.Sc.	none
FI	University of Turku, Faculty of Mathematics and Natural Sciences	Environmental Sciences	ES / AES	4	M.Sc.	Geoinformatics in Environmental Research
FI	Oulu University, Faculty of Science	Environmental Science	ES	4	M.Sc.	none
FR	University of Sciences and Technology Lille 1, UFR Earth Sciences	Environments	ES	4	M.Sc.	Geosciences
FR	University of Cergy-Pontoise	Environmental Sciences	ES		Master professionnel	none

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
FR	University of Bourgogne, UFR Environmental and Earth Sciences	Environmental Sciences	ES	2	M.Sc.	none
HR	University of Zagreb, Faculty of Science	Environmental sciences	ES	4	M.Sc.	none
HU	University of Szeged, Faculty of Sciences	Environmental Sciences	ES / AMS	4	M.Sc.	Environmental Earth Sciences
HU	Eötvös L. University Budapest, Faculty of Sciences	Environmental science	ES / AMS	4	M.Sc.	Environmental Earth Sciences
HU	University of Miskolc, Faculty of Earth Sciences and Engineering	Environmental sciences	ES		M.Sc.	none
IE	University of Dublin, Trinity College	Environmental Sciences	ES	2	M.Sc.	none
IE	University College Dublin, School of Biology and Earth Sciences	Environmental Sciences	ES	2	M.Sc.	none
IT	University Ca'Foscari Venice, Faculty of Mathematical, Physical and Natural Sciences	Environmental Sciences	ES	4	Laurea magistrale	Analysis of terrestrial resources and ecosystems
IT	Universita degli studi di Pavia, Faculty of Mathematical, Physical and Natural Sciences	Natural Sciences	ES	2	Laurea specialistica	Earth Sciences
PT	University of Jaen, Faculty of Experimental Sciences	Environmental Sciences	ES	2	Licence	none
PT	University of Aveiro, Department of Geosciences	Joint European Master in Environmental Studies (JEMES)	ES	4	M.Sc.	none
UK	University of Greenwich, Department of Earth and Environmental Sciences	Environmental Sciences	ES	2	Master by research	none
UK	University of Glasgow, Centre for Geosciences	Environmental Science	ES	2	M.Sc.	none
UK	University of East Anglia Norwich, Faculty of Science	Environmental Sciences	ES	2	M.Sc.	none
CH	University of Geneva, Faculty of Sciences	Engineering Geology	Eng	4	M.Sc.	Engineering Geology
DK	Aarhus University, Faculty of Science	Process engineering	Eng	4	Graduate engineer	none
ES	University of Vigo, E.T.S. Mining engineering	Mining engineering	Eng / MatS	10	Master (1st degree)	Materials
ES	University of Vigo, E.T.S. Mining engineering	Mining engineering	Eng / AMatS	10	Master (1st degree)	Energy
ES	University of Vigo, E.T.S. Mining engineering	Mining engineering	Eng / AES	10	Master (1st degree)	Environment and mining
ES	University of Vigo, E.T.S. Mining engineering	Mining engineering	Eng	10	Master (1st degree)	none
FR	Nancy University, Ecole Nationale Supérieure de Geologie	(Geological) Engineering	Eng	2 (out of 10)	M.Sc.	Geotechnical engineering
FR	Nancy University, Ecole Nationale Supérieure de Geologie	(Geological) Engineering	Eng	3 (out of 10)	M.Sc.	Environmental sciences and technologies
FR	Nancy University, Ecole Nationale Supérieure de Geologie	(Geological) Engineering	Eng	4 (out of 10)	M.Sc.	Engineering and Management of mineral resources
IT	University of Padova, Faculty of Mathematical, Physical and Natural Sciences	Materials Engineering	Eng / AMatS	4	M.Sc.	none

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
PL	Wroclaw University of Technology, Faculty of Geoengineering, Mining and Geology	Geoengineering, mining and geology	Eng / AGS	10	Master (1st degree)	Mining and geology
PL	Warsaw University, Faculty of Geology	Geological engineering	Eng	10	Master (1st degree)	none
PT	University of Evora, Department of Geosciences	Geological Engineering	Eng	4	M.Sc.	Geotechnics and georesources
PT	University of Coimbra, Faculty of Sciences and Technology	Mining and Geological Engineering	Eng	4	M.Sc.	none
PT	University of Aveiro, Department of Geosciences	Geological Engineering	Eng	4	M.Sc.	none
PT	The New University of Lisbon, Department of Earth Sciences	Geological Engineering	Eng	4	M.Sc.	Georesources
PT	The New University of Lisbon, Department of Earth Sciences	Geological Engineering	Eng	5	M.Sc.	Geotechnics
SRB	University of Belgrade, Faculty of Mining and Geology	Mining Engineering	Eng	2	M.Sc.	none
UK	University of Portsmouth, School of Earth and Environmental Sciences	Engineering geology	Eng	2	M.Sc.	none
UK	University of Birmingham, Geography, School of Civil Engineering	Geotechnical engineering	Eng	2	M.Sc.	none
UK	Newcastle University, Civil engineering and geosciences Centre	Engineering Geology	Eng	2	M.Sc.	none
AT	University of Vienna, Faculty for Geosciences, Geography and Astronomy	Earth Sciences	EarthS / GS	4	M.Sc.	Geology
AT	University of Vienna, Faculty for Geosciences, Geography and Astronomy	Earth Sciences	EarthS / AGS	4	M.Sc.	Technical geology
AT	University of Graz, Institute of Geosciences	Earth Sciences	EarthS	4	M.Sc.	none
CH	University of Fribourg, Faculty of Sciences	Earth Sciences	EarthS	3	M.Sc.	none
CH	Basel University, Faculty of Natural Sciences	Earth Sciences	EarthS	3	M.Sc.	none
EE	Tallinn University of Technology, Faculty of Science	Earth Sciences	EarthS	2	M.Sc.	none
FR	University of Rennes 1, UFR Life and Earth Sciences	Earth Sciences and environment	EarthS / ES	4	M.Sc.	Earth Sciences
FR	University of Montpellier, Faculty of Sciences	Earth and Environmental Sciences	EarthS / ES	4	M.Sc.	none
FR	University Paul Sabatier Toulouse	Earth Sciences	EarthS	4	Master by research	Earth and Solid Planets Sciences (STPS)
FR	University Paul Sabatier Toulouse	Earth Sciences	EarthS	4	M.Sc.	Environmental engineering
FR	University Paris-Sud 11, Faculty of Sciences in Orsay	Earth and Universe Sciences	EarthS	4	M.Sc.	none
FR	University Joseph Fourier Grenoble, Observatoire des sciences de la Terre	Sciences-Technology-Health	EarthS		Master by research	Earth, Ocean, Atmosphere, Hydrology
FR	University Claude Renard Lyon + Ecole Normale Supérieure de Lyon	Earth Science	EarthS	4	Master by research	Physics and Chemistry of the Earth and Planets

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
FR	Universite Blaise Pascal, Clermont-Ferrand, UFR Science et Technologies	Earth Sciences	EarthS	2+3	Master 1 (research) +M2 (professional)	Magma and volcanos
FR	Universite Blaise Pascal, Clermont-Ferrand	Earth Sciences	EarthS	2+2	Master 1 (research) +M2 (professional)	Geology of the environment
NL	VU Amsterdam, Faculty of Earth and Life Sciences	Earth Sciences	EarthS	6	M.Sc.	none
NO	University of Bergen, Faculty of Mathematics and Natural sciences	Earth Science	EarthS		Master	Marine Geoscience and Geophysics; Environmental Geoscience;
PT	University of Evora, Department of Geosciences	Earth, Air and Space Sciences	EarthS		M.Sc.	none
SE	Uppsala University, Faculty of Science and Technology	Earth Sciences	EarthS	4	M.Sc.	Geology
UK	University of Cambridge	Earth Sciences and Geography	EarthS	2	M.Phil. (by research only)	Fluid Flow in Industry and the Environment
UK	University of Bristol, Department of Earth Sciences	Earth System Science	EarthS	2	M.Sc.	none
UK	University College London, Birbeck School of Earth Sciences	Earth Sciences	EarthS	4	M.Res.	none
UK	Durham University, Department of Earth Sciences	Earth Sciences	EarthS	2	M.Sc.	none
UK	Durham University, Department of Earth Sciences	Earth Sciences	EarthS	4	M.Phil.	none
DE	Philipps University Marburg	Geoarcheology	CH	4	M.Sc.	none
ES	Polytechnical University of Valencia	Conservation and restoration of cultural heritage	CH	2-4	M.Sc.	none
IT	Universita degli studi di Torino, Faculty of Mathematical, Physical and Natural Sciences	Science and technology of Cultural heritage	CH / AES	4	Laurea magistrale	none
IT	University of Modena and Reggio Emilia, Faculty of mathematics, Physics and Natural Sciences	Sciences for Recovering and Conservation of Archaeological Heritage	CH	6	Laurea magistrale	none
IT	University of Camerino, Faculty of Sciences	Geoarcheology and geoarcheometry	CH	4	Laurea magistrale	none
IT	University degli studi di Urbino "Carlo Bo", Faculty of Letters and Philosophy + Faculty of Science and Technology	Conservation and restoration of cultural and artistic heritage	CH	4	Laurea specialistica	none
IT	Universita degli studi di Parma, Faculty of Mathematical, physical and natural Sciences	Sciences for Cultural heritage	CH	4	Laurea magistrale	none
IT	Universita degli Studi di Bari, Faculty of Mathematics, Physics and Natural Sciences	Science and Technology for Diagnosis and Conservation of Cultural Objects	CH	2	Laurea Magistrale	none
PT	University of Minho, Earth Sciences Department	Geological heritage and geoconservation	CH	4	M.Sc.	none

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
PT	University of Coimbra, Faculty of Sciences and Technology	Conservation and Restoration	CH	4	M.Sc.	none
UK	University of Reading, School of Human and Environmental Science	Geoarcheology	CH / AGS	2	M.Sc.	none
UK	The University of Sheffield, Department of Archeology + Department of Geography	Geoarchaeology	CH / AGS	2	M.Sc.	none
UK	The University of Sheffield, Department of Archeology + Department of Geography	Archaeological Materials	CH	2	M.Sc.	none
DE	Technical University Clausthal, Institute for Waste disposal research	Radioactive and Hazardous Waste Management	AES	4	M.Sc.	none
DE	Eberhard Karls University Tübingen, Institute for Geoscience	Applied Environmental Geoscience	AES	4	M.Sc.	none
DE	Carl von Ossietzky University Oldenburg, Institute for Chemistry and Biology of Marine Environment	Marine Environmental Sciences	AES	4	M.Sc.	none
DE	Brandenburgische Technische Universität Cottbus, Faculty for Environmental Sciences and Process Engineering	Environmental and Resource Management	AES		M.Sc.	none
ES	University of Vigo, Faculty of Sciences	Marine sciences	AES	10	Master (1st degree)	Marine environment and contamination
ES	University of Seville, Faculty of Chemistry	Advanced studies in Chemistry	AES	2	M.Sc.	Industrial and environmental chemistry
ES	University of Vigo, Faculty of Sciences	Marine sciences	AES	10	Master (1st degree)	Ocean and environment
FR	University Paul Sabatier Toulouse	Water, soils, environment	AES / AGS	4	Master by research	Hydrology, hydrochemistry, soil, environment (H2SE)
FR	University of Rouen + University of Caen	Sciences of the Environment	AES / AGS	4	M.Sc.	Environment, soils, water, biodiversity
FR	Ecole des mines Paris (ParisTech)	Managing of the environment (Genie de l'environnement)	AES / AEng	3	M.Sc.	Management and treatment of water, soil and waste
FR + UK + ES	Universite Bordeaux 1 + University of Southampton + University of the Basque Country	Marine Environment and Resources	AES		European Master	none
IT	Universita degli studi di Torino, Faculty of Mathematical, Physical and Natural Sciences	Chemistry of the environment and of Cultural heritage	AES / CH	4	Laurea magistrale	none
IT	Universita degli studi di Siena, Faculty of Mathematical, Physical and Natural Sciences	Environmental geotechnology	AES / AGS	4	MSGGA	none
IT	University of Padova, Faculty of Mathematical, Physical and Natural Sciences + Faculty of Agriculture	Land and environment science and technology	AES / AEng	4	Laurea magistrale	none

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
IT	Università degli studi di Parma, Faculty of Mathematical, physical and natural Sciences	Science and technology for the environment and for the resources	AES / AEng	4	Laurea magistrale	none
IT	University of Camerino, Faculty of Sciences	Geoenvironmental resources and risks	AES	4	Laurea magistrale	none
IT	Università degli studi di Torino, Faculty of Mathematical, Physical and Natural Sciences	Environmental analysis and management	AES	4	Laurea magistrale	none
IT	Università degli Studi di Firenze, Department of Earth Science	Soil protection (science)	AES	4	Laurea magistrale	none
IT + DE + UA	Università degli studi di Parma + University of Applied Sciences Mittweida + Zhitomir Institute of Engineering and Technology	Science and technology for the sustainable development of contaminated sites	AES / AEng	2	International Master	none
PL	Warsaw University, Faculty of Geology	Environment protection	AES	10	Master (1st degree)	none
SI	University of Ljubljana	Environmental protection	AES	4	M.Sc.	none
UK	University of Reading, School of Human and Environmental Science	Soils & Environmental Pollution	AES / AMS	2	M.Sc.	none
UK	University of Portsmouth, School of Earth and Environmental Sciences	Contaminated land	AES	2	M.Sc.	none
UK	University of Portsmouth, School of Earth and Environmental Sciences	Geohazard Assessment	AES	2	M.Sc.	none
UK	University of East Anglia Norwich, Faculty of Science	Environmental Assessment and Management	AES	2	M.Sc.	none
UK	University of Brighton, School of environment and technology	Environmental Assessment and Management	AES	2	M.Sc.	none
UK	The University of Sheffield, Department of Geography	Environmental Analysis of Terrestrial Systems	AES	2	M.Sc.	none
UK	Royal Holloway, University of London, Department of Earth Sciences	Environmental Diagnosis and Management	AES	2	M.Sc.	none
UK	Newcastle University, Civil engineering and geosciences Centre	Environmental Biogeochemistry with Consultancy Skills	AES	2	M.Sc.	none
CH	Swiss Federal Institute of Technology Zurich (ETH), Department of Civil, Environmental and Geomatic Engineering	Environmental Engineering	AEng / AES	2-3	M.Sc.	Soil conservation
DE	Technical University + Ludwig-Maximilians University Munchen	Engineering and Hydrogeology	AEng	4	M.Sc.	none
DE	RWTH Aachen University, Geological Institute	Mineral Resources Engineering (EMMEP)	AEng			none
ES	University of Seville, Faculty of Chemistry	Environment and Production Technology	AEng / AES	2 + 2	M.Sc.	none
ES	Complutense University Madrid, Faculty of Geological Sciences	Geological engineering and geotechnics	AEng	3	M.Sc.	none

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
Euro pean Master	Wroclaw University of Technology + University of Miskolc + University of Exeter, Camborne School of Mines	Erasmus Mundus Minerals and Environmental Programme (EMMEP)	AEng / AES	2+2	Master	Geotechnical and Environmental Engineering
FR	University of Rouen + University of Caen	Sciences of the Environment	AEng / AGS	4	M.Sc.	Coastal engineering and geosciences
FR	Ecole des Mines Paris (ParisTech)	Science and Executive Eng.	AEng / AGS	6	M.Sc.	Geosciences (as Minor)
FR	Nancy University, Ecole Nationale Supérieure de Géologie	Waste control	AEng	2	M.Sc.	none
HU	University of Pannonia Veszprem, Faculty of Engineering	Environmental Engineering	AEng / AES	4	M.Sc.	none
HU	University of Miskolc, Faculty of Earth Sciences and Engineering	Mining and geotechnics	AEng		M.Sc.	none
IT	Politechnical University of Torino, Faculty of Engineering	Engineering of the environment and of the territory	AEng / AES	4	Laurea specialistica	Geoengineering
IT	University of Ferrara, Department of Earth Sciences	Geotechnology of Environmental Monitoring for Land planning	AEng	2	M.Sc.	none
NO	Norwegian University of Science and Technology Trondheim, Faculty of Engineering Science and Technology	Geotechnics and Geohazards	AEng / AGS	4	M.Sc.	none
PL	AGH University of Science and Technology	Environmental Engineering	AEng	4	M.Sc.	none
PL + FI	Wroclaw University of Technology, Faculty of Geoengineering, Mining and Geology + Helsinki University of Technology	Minerals Engineering (EMEC)	AEng	4	M.Sc.	none
RO	University of Bucharest, Faculty of Geology and Geophysics	Environmental Geological Engineering	AEng	4	M.Sc.	none
UK	Newcastle University, Civil engineering and geosciences Centre	Environmental Engineering	AEng / AES	2	M.Sc.	none
UK	University of Glasgow, Centre for Geosciences	Geotechnical Engineering	AEng	2	M.Sc.	none
UK	University of Exeter, Camborne School of Mines	Minerals Engineering (EMEC)	AEng	2	M.Sc.	none
UK	University of Exeter, Camborne School of Mines	Minerals Engineering	AEng	2	M.Sc.	none
UK	The University of Manchester, School of Mechanical, Aerospace and Civil Engineering	Geotechnical Engineering	AEng	2	M.Sc.	none
UK	The University of Nottingham, Department of Chemical and Environmental Engineering	Environmental and Resource Engineering	AEng	2	M.Sc.	none
UK	The University of Nottingham, Department of Chemical and Environmental Engineering	Environmental Engineering	AEng	2	M.Sc.	none
UK	Newcastle University, Civil engineering and geosciences Centre	Engineering geology with consultancy skills	AEng	2	M.Sc.	none
UK	Newcastle University, Civil engineering and geosciences Centre	Geotechnical Engineering with consultancy skills	AEng	2	M.Sc.	none

Country	University, Faculty (in red, Partners in the EUROMIN project)	2nd cycle Programme	EUROMIN Programme code (see colour legend)	Duration full-time (sem)	Degree awarded	Specialization
UK	Cardiff University, School of Earth and Ocean Sciences	Geoenvironmental Engineering	AEng	2	M.Sc.	none
BE	Ghent University	Physical land resources	AEarthS	4	M.Sc.	Soil science
FR	University of Nice – Sophia Antipolis, Faculty of Sciences	Sciences and management of the Earth	AEarthS	4	M.Sc.	none
NL	Utrecht University, Faculty of Geosciences	System Earth Modelling (Prestige's Masters)	AEarthS	4	M.Sc.	none
NL	Delft University of Technology	Applied Earth Sciences	AEarthS	4	M.Sc.	Track: Petroleum Engineering and Geosciences
NL	Delft University of Technology	Applied Earth Sciences	AEarthS	4	M.Sc.	Geo-engineering
PT	University of Coimbra, Faculty of Sciences and Technology	Biology and Geology for Teachers	AEarthS	4	M.Sc.	none
UK	University of Greenwich, Department of Earth and Environmental Sciences	Environmental and Earth Sciences	AEarthS	2-3	M.Phil.	none
UK	University of Bristol, Department of Earth Sciences	Science of Natural Hazards	AEarthS	2	M.Sc.	none
UK	Kingston University London, School of Geography, Geology and the Environment	Environmental and Earth Resources Management	AEarthS	2	M.Sc.	none
UK	Kingston University London, School of Geography, Geology and the Environment	Hazards and Disaster Management	AEarthS	2	M.Sc.	none
DE	University Potsdam + Volkswagen Foundation	Evolution across scales	O	4	M.Sc.	none
ES	University of Vigo, Faculty of Sciences	Marine sciences	O	10	Master (1st degree)	Living resources
ES	University of Seville, Faculty of Geography and History	Arrangement and Management of the Territorial and Local Development	O	2	M.Sc.	none
ES	Autonomous University Madrid, Department of Agricultural Chemistry	Agricultural Chemistry	O	2	M.Sc.	none
IT	Università degli studi di Parma, Faculty of Mathematical, Physical and Natural Sciences	Forensic sciences	O	2	Master	Scientific disciplines, engineering, pharmacy
IT	Università degli studi di Parma, Faculty of Mathematical, Physical and Natural Sciences	Forensic sciences	O	2	Master	Law, politic sciences and psychology

LEGEND: EUROMIN Programmes codes (used through the Annexes):

MS / AMS	Mineral sciences & Applied mineral sciences
GS	Geological sciences / Geosciences & Applied geological sciences / Geosciences
EarthS	Earth sciences & Applied Earth sciences
ES	Environmental sciences & Applied environmental sciences
AES	Applied Env. sci. incl. Natural risks and waste management
MatS	Material science & Applied material science
Eng / Ang	Engineering (including mining, oil and gas), Applied engineering
CH	Cultural heritage
O	Others

Annex 6: Directory of Mineral Sciences-related career opportunities and current employability

Type of activity	Job title	Minimum academic qualification (degree)	Academic degree profile	Region / Country of employment (current offers, 2008)
Academic research	Climate change	PhD	MS / GS	DE
Academic research	Experimental mineralogy	MSc	MS / GS	DK
Academic research	Isotopic geology	MSc	MS / GS	SE
Academic research	Mineralogy	MSc	MS / GS	SE
Academic research	Project Geochemist	MSc	MS / GS	Canada
Academic research	Material science / Crystallography	MSc	MS	CH
Academic research	Mineralogy, petrology, geochemistry	PhD	MS	DE
Academic research	Climate record	MSc	GS / MS	DE
Academic research	Geosciences-Geochemistry	MSc	GS / MS	DE
Academic research	Geosciences-Geochemistry	PhD	GS / MS	DE
Academic research	Sediment geochemistry	PhD	GS / MS	CH
Academic research	Biogeochemistry	PhD	GS / ES	Canada, Australia
Academic research	Biogeochemistry	MSc	GS / ES	SE
Academic research	Biogeochemistry	PhD	GS / ES	NL
Academic research	Sedimentary petrology	MSc	GS	UK
Academic research	Finite Element modelling of 3D geotechnical problems and comparison with simple solutions	MSc	Eng	UK
Academic research	Earth Science	MSc	EarthS	DE
Academic research	Earth System modeller	PhD	EarthS	UK
Academic research	Earth System science	MSc	EarthS	DE
Academic research	Ecosystem-Atmosphere Exchange of CO2	PhD	EarthS	USA
Academic research	Geo-material sciences	MSc	AMS / AGS	DE
Academic research	Mineral surface chemistry	PhD	AMS	SE
Academic research	Mineral surface chemistry	MSc	AMS	SE
Academic research	Applied geology	MSc	AGS	SE
Academic research	Applied environmental science	PhD	AES	SE
Academic teaching	Geosciences	PhD	GS	UK
Academic teaching	Computational Earth Sciences & Engineering	PhD	ES / Eng	Saudi Arabia
Academic teaching	Natural Resources, Management/Environmental Conservation	PhD	ES / EarthS	UK
Academic teaching	Environmental Sciences	PhD	ES	Quatar
Academic teaching	Environmental geochemistry	PhD	AMS / ES	UK
Agriculture	Environmental Scientist	BSc	AES / AGS	IE, UK
Agriculture	Soil analyst	BSc	AES / AGS	Europe
Archeometry	Ceramics, glass expert	MSc	AMS	Italy, Spain
Archeometry	Expert in analytical methods	MSc	MS / AMS	Italy, Spain
Archeometry	Geologist	MSc	AMS / AGS	Italy, Spain
Building materials	Geologist		AMS / AGS	Italy
Computing (geological applications)	Environmental Engineer, Dynamic Thermal Modeller	MSc	Eng	UK
Computing (geological applications)	Technical Author - Geoscience System	BSc	GS / EarthS	UK
Constructions	International Geology Manager	MSc	Eng / GS	UK
Constructions	Building site coordinator	BSc	Eng / AGS	DK
Constructions	Civil and environmental engineer	BSc	Eng / AGS	IT
Cultural heritage	Architectural and environmental curator	BSc	AMS / ES / Eng	IT, UK

Type of activity	Job title	Minimum academic qualification (degree)	Academic degree profile	Region / Country of employment (current offers, 2008)
Cultural heritage	Cleaning of monuments, facades and buildings	BSc	AMS / ES / Eng	AT
Cultural heritage	Conservation / Historic Building Specialist	BSc	AMS / AGS	UK
Cultural heritage	Conservator	BSc	AMS / AGS	
Cultural heritage	Restorer	BSc	AMS / AGS	CZ
Development of water resources	Geoscientist	BSc	AGS	Europe
Engineering geology	Engineering Geologist	MSc	Eng	UK
Engineering geology	Foundation and Geotechnical Engineer	MSc	Eng / AGS	United Arab Emirates
Engineering geology	Geotechnical Engineer/Engineering Geologist	MSc	Eng / AGS	Abu Dhabi
Environmental (general)	Environmental and Sustainability Consultant	MSc	ES / AES	UK
Environmental (general)	Environmental Engineer, Education Sector	MSc	ES / Eng	UK
Environmental (general)	Consultant, Environmental Permitting & Compliance	BSc	ES / AES	UK
Environmental (general)	Environmental engineer	BSc	AES / Eng	UK
Environmental (general)	Environmental Project Manager (Minerals and Metals)	MSc	AES / AGS / Eng	UK
Environmental (general)	Environmental scientist	BSc	ES	USA
Environmental (general)	Executive Environmental Engineer - Sustainability	MSc	Eng / AES	UK
Environmental (general)	Geotechnical/Geo-Environmental Consultant	MSc	Eng / GS / ES	UK
Environmental (general)	Interpretative Geo-Environmental Engineer	MSc	ES / AGS	UK
Environmental (general)	Technical Manager - Environmental Engineering	MSc	ES / Eng	UK
Environmental (general)	Technicien environnement		AES	France
Geochemistry	Géochimiste	MSc	MS / GS	France
Geotechnical engineering	Environmental Engineer : Air Quality, Noise, Safety and Contaminated Land - Cheshire	MSc	Eng / ES / GS	UK
Geotechnical engineering	Geo-Environmental Engineer	MSc	Eng / ES / GS	UK
Geotechnical engineering	Geotechnical Consultant	BSc	Eng / AGS	UK
Geotechnical engineering	Geotechnical Laboratory Technician/Laboratory Manager	BSc	Eng / AGS	UK
Geotechnical engineering	Consultant Geotechnical Engineer	BSc	Eng	Saudi Arabia
Geotechnical engineering	Geo-Environmental Engineer	MSc	Eng / ES / GS	UK
Geotechnical engineering	Geo-Environmental Engineer/Consultant	MSc	Eng / ES / GS	UK
Geotechnical engineering	Geo-Environmental Regional Office Head	MSc	Eng / ES / GS	UK
Geotechnical engineering	Geotechnical Design Engineer	MSc	Eng	UK
Geotechnical engineering	Geotechnical Engineer	BSc	Eng	Australia
Geotechnical engineering	Geotechnical Engineer	BSc	Eng	UK
Geotechnical engineering	Junior Geotechnical Site Investigation Engineer	MSc	Eng	UK
Geotechnical engineering	Land surveyor	BSc	Eng	GR, CY, ES, UK
Geotechnical engineering	Landfill and Quarry Expert	MSc	Eng / ES	UK

Type of activity	Job title	Minimum academic qualification (degree)	Academic degree profile	Region / Country of employment (current offers, 2008)
Geotechnical engineering	Pollution Control Engineer	BSc	Eng / ES / GS	Australia
Geotechnical engineering	Site Investigation Engineer	MSc	Eng	
Geotechnical engineering	Team Leader - Geotechnics/Ground Investigation	BSc	Eng	UK
Geothermal energy, CO2 sequestration	Geoscientist	BSc	AGS / AEarthS	Europe, USA
Government non-regulatory	Médiatisation Inventaire géologique	BSc	GS / AGS	France
Government non-regulatory	Specialist/ Scientist - Geology	BSc	GS / AGS	South Africa
Government regulatory	Customs officer/agent	MSc	GS / AGS	Europe
Government regulatory	Inspector geoscientist	MSc	GS / AGS	CZ, BG, EE, GR
Government regulatory	Environmental consultant	MSc	GS / AGS	CZ
Government regulatory	Environmental policy consultant	MSc	GS / AGS	CZ
Government regulatory	Environmental assessor	MSc	GS / AGS	EE
Government regulatory	Environmental auditor	BSc	GS / MS	ML, PL, ES
History of science	Geoscientist	MSc	GS / MS	Europe
Management & Executive	Portfolio Analyst (oil industry)	MSc	AGS / Eng	UK
Material science & technology	Responsible development geocomposites	BSc	MatS / AMS	France
Media (scientific, economic, news)	Assistant Editor (Industrial minerals)	BSc	GS / AMS	UK
Mineral exploration / mining geology	Economic Geologist	BSc	AMS / GS	Canada
Mineral exploration / mining geology	Geochemist	MSc	MS / ES	Australia
Mineral exploration / mining geology	Materials Man	BSc	Eng	Dubai
Mineral exploration / mining geology	Mine Geologist	BSc	GS / Eng	Asia
Mineral exploration / mining geology	Mine Geologist	BSc	GS / Eng	South Africa
Mineral exploration / mining geology	Mining Engineer (Geotechnical & Tailings Project Manager)	BSc	Eng / AGS	Canada
Mineral exploration / mining geology	Open pit mining engineer	BSc	Eng	Canada
Mineral exploration / mining geology	Resource Geologist	BSc	GS	UK
Mineral exploration / mining geology	Analytical QAQC Officer	BSc	GS	Australia
Mineral exploration / mining geology	Chief/ Mine Geologist	BSc	GS	Africa
Mineral exploration / mining geology	Community Manager (Mining & Metals Industry)	MSc	Eng / AGS	CH
Mineral exploration / mining geology	Consultant Resource Geologist	BSc	GS / AGS	Australia
Mineral exploration / mining geology	Consulting Geologist	BSc	AGS / AMS	UK
Mineral exploration / mining geology	Divisional Manager - Resource Evaluation	BSc	GS	Canada
Mineral exploration / mining geology	Environmental Scientist	MSc	ES / AGS	
Mineral exploration / mining geology	Experienced Mine Modeling Software User - Maptek/Vulcan	BSc	GS / Eng	USA
Mineral exploration / mining geology	Exploration Geologist	BSc	AGS / AMS	SE, NO, FI
Mineral exploration / mining geology	Exploration geologist	BSc	GS	UK
Mineral exploration / mining geology	Geochemist	BSc	AMS	Chile

Type of activity	Job title	Minimum academic qualification (degree)	Academic degree profile	Region / Country of employment (current offers, 2008)
Mineral exploration / mining geology	Geological Advisor	BSc	AGS / AMS	IE
Mineral exploration / mining geology	Geological Assistant	BSc	GS / AGS	Canada
Mineral exploration / mining geology	Geological Data Analyst	MSc	AGS / AMS	Canada
Mineral exploration / mining geology	Geologis - Business planning	MSc	GS	Congo
Mineral exploration / mining geology	Geology	MSc	GS	UK
Mineral exploration / mining geology	Geoscientist	BSc	GS / AGS	
Mineral exploration / mining geology	Long term planning/project engineer (FIFO)	BSc	Eng	Canada
Mineral exploration / mining geology	Mine geologist	BSc	AGS	
Mineral exploration / mining geology	Mine Tailings Project Manager	BSc	AGS / Eng	IE
Mineral exploration / mining geology	Mineral economist	BSc	AMS / AEng	USA
Mineral exploration / mining geology	Mineral Processing Engineer	BSc	AMS / Eng	UK
Mineral exploration / mining geology	Mineral specialist	BSc	AMS / Eng	USA
Mineral exploration / mining geology	Mining Geologist	MSc	AGS / AMS	Australia
Mineral exploration / mining geology	Operations Manager - metallurgy and mineralogy	BSc	AMS / Eng	South Africa
Mineral exploration / mining geology	Project geologist	BSc	GS	South America
Mineral exploration / mining geology	Resource Evaluation Geologist-Consultant	BSc	GS / AGS	Canada
Mineral exploration / mining geology	Resource Geologist	BSc	AGS / AMS	ES
Mineral exploration / mining geology	Resource geologist	BSc	AMS / GS	
Mineral exploration / mining geology	Responsable d'exploitation carrières		AGS / Eng	France
Mineral exploration / mining geology	Sample Preparers - Minerals Processing	BSc	GS / EarthS / ES	Australia
Mineral exploration / mining geology	Sectional Geologist exploration	BSc	GS	South Africa
Mineral exploration / mining geology	Soil scientist	BSc	AMS / ES	
Mineral exploration / mining geology	Specialist Process	BSc	MatS / Eng	Africa
Mineral exploration / mining geology	Superintendent, Geology Quality Assurance	BSc	AGS / Eng	Indonesia
Mineral exploration / mining geology	Tailings Engineer	BSc	Eng	Australia
Mineral exploration / mining geology	Technical Specialist, Metal Extraction Products	BSc	MatS / Eng	USA
Mineral exploration / mining geology	Wellsite Geologist	BSc	GS / AGS	UK
Museum curation / education	Assistant Curator (BOSCORF)	BSc	MS / GS	UK
Museum curation / education	Curator	MSc	MS / GS	Europe, USA
Museum curation / education	Museum worker	BSc	MS / GS / EarthS	PL, SI
Museum curation / education	Conservator/Conservator-restorer/Restorer/Renovator	BSc	AMS / AGS	LT, MT, PL, SK, SI

Type of activity	Job title	Minimum academic qualification (degree)	Academic degree profile	Region / Country of employment (current offers, 2008)
Museum curation / education	Researcher	PhD	MS / GS	Europe, USA
Natural hazards and Climate change	Contaminated Land Risk Assessor	MSc	ES /GS /Eng	UK
Natural hazards and Climate change	Catastrophe Risk Flood Modeller	MSc	ES /GS	UK
Oil and gas industry (exploration)	Mineralogist	BSc	MS / GS / EarthS	USA
Oil and gas industry (exploration)	Production Technologist	BSc	Eng / GS / EarthS	NL
Oil and gas industry (exploration)	Carbonate geologist	MSc	GS	UK
Oil and gas industry (exploration)	Clastic geologist	MSc	GS	UK
Oil and gas industry (exploration)	Database and applications manager	BSc	GS	NO
Oil and gas industry (exploration)	Exploration Geologist	MSc	GS / AGS	Libya
Oil and gas industry (exploration)	Exploration Geoscientist	BSc	GS / AEng	Canada
Oil and gas industry (exploration)	Exploration License Team Leader	MSc	GS / AGS	EU
Oil and gas industry (exploration)	Explorationist	BSc	GS / AGS	Malaysia
Oil and gas industry (exploration)	Explorationist	BSc	GS / AGS	CH
Oil and gas industry (exploration)	Geologist	BSc	GS	UK
Oil and gas industry (exploration)	Geologist	BSc	GS	NO
Oil and gas industry (exploration)	Geologist Producer	BSc	GS	CH
Oil and gas industry (exploration)	Geoscience Trainer	MSc	GS	UK
Oil and gas industry (exploration)	Geosciences Manager	BSc	GS	Canada
Oil and gas industry (exploration)	Ingénieur GE - Géotechnicien Offshore	BSc	GS / AEng	France
Oil and gas industry (exploration)	Instrument Analyst	BSc	AGS / AMS	UK
Oil and gas industry (exploration)	Mud logging geologist	BSc	GS	RO
Oil and gas industry (exploration)	Operations Geologist	BSc	GS / AGS	UK
Oil and gas industry (exploration)	Operations Geologist	BSc	GS / AGS	Turkmenistan
Oil and gas industry (exploration)	Reservoir geologist	BSc	GS	NL
Oil and gas industry (exploration)	Staff Development Geologist	BSc	GS	Canada
Oil and gas industry (exploration)	Staff Geologist	BSc	GS	Canada
Oil and gas industry (exploration)	Technical Support Manager - Airborne Surveys	BSc	GS / EarthS	UK
Oil and gas industry (exploration)	Tellus Client Manager	MSc	GS	UK
Physical (land) planning	Recherche de stage : aménagement, génie civil	BSc	Eng / AGS	France
Physical (land) planning	Town planner	BSc	Eng / AGS	CY, DE, IE, LT, PL, NL, SI, UK
Physical (land) planning	Town and Country Planner	BSc	Eng / AGS	CY, DE, IE, LT, PL, NL, SI, UK
Professional associations / NGO's	Executive Secretary (EGU)	MSc	GS	EU

Type of activity	Job title	Minimum academic qualification (degree)	Academic degree profile	Region / Country of employment (current offers, 2008)
Public health	Asbestos Analyst and Management Consultant	BSc	AMS / AGS	UK
Public health	Asbestos Analytical Staff	MSc	AMS / AGS	UK
Public health	Asbestos Surveyors	BSc	AMS / AGS	UK
Public health	Qualified Asbestos Surveyors	BSc	AMS / AGS	UK
Research, other (non-academic)	Chargé de projets géo-scientifiques	MSc	GS	France
Research, other (non-academic)	Cosmochemistry	MSc	MS / EarthS	DK
Research, other (non-academic)	Cosmochemistry	PhD	MS / EarthS	DK
Research, other (non-academic)	Metallogenist	PhD	MS	Canada
Research, other (non-academic)	Project geologist: Provenance and geological mapping	PhD	GS	DK
Research, other (non-academic)	Research Fellow in Geology/Geochemistry	PhD	MS	Australia
Research, other (non-academic)	Research Geologist	PhD	GS	USA
Research, other (non-academic)	Research scientist	MSc	MatS	USA
Research, other (non-academic)	Scientist	BSc	GS / EarthS	USA
Secondary school level teaching	Teacher (Earth sciences etc.)	BSc	EarthS / GS	Europe, USA
Soil protection and geoheritage	Acid Sulfate Soil Scientist	BSc	ES / AGS	Australia
Soil protection and geoheritage	Contaminated Land and Remediation Project Manager	MSc	ES / GS	UK
Soil protection and geoheritage	Contaminated Land Specialist	BSc	ES / GS	Australia
Soil protection and geoheritage	Directeur services études sols	MSc	ES / AGS	France
Soil protection and geoheritage	Graduate Contaminated Land Consultant	MSc	ES / GS	UK
Soil protection and geoheritage	Natural Resource Management Specialist	BSc	GS / ES	Africa
Soil protection and geoheritage	Project Manager (Contaminated Land)	BSc	ES / GS	UK
Soil protection and geoheritage	Remediation Engineer	MSc	ES / GS	UK
Soil protection and geoheritage	Soil scientist	PhD	ES / GS	UK
Soil protection and geoheritage	Team Leader - Contaminated Land	MSc	ES / GS	UK
Training/educational activities, other (travel agencies, recreational activities etc.)	Field studies instructor	BSc	GS / ES / EarthS	UK
Training/educational activities, other (travel agencies, recreational activities etc.)	Geology Tutor	BSc	GS / ES	UK
Training/educational activities, other (travel agencies, recreational activities etc.)	National Park guide	BSc	EarthS / GS	GR
Training/educational activities, other (travel agencies, recreational activities etc.)	Nature protection worker	BSc	EarthS / GS	SI
Training/educational activities, other (travel agencies, recreational activities etc.)	Organiser adult education	MSc	GS / MS	SI

Type of activity	Job title	Minimum academic qualification (degree)	Academic degree profile	Region / Country of employment (current offers, 2008)
activities etc.)				
Waste management	Geochemist	MSc	ES / GS / MS	Australia
Waste management	Radioactive Waste Management Consultant	BSc	AES	UK
Waste management	Bid / Procurement Director, Waste Management	MSc	ES /AGS	UK
Waste management	Business Development Manager - Waste	BSc	AES /AGS	UK
Waste management	Chef de centre de stockage de déchets	MSc	AES /AGS	France
Waste management	Civil/Structural Engineers (Waste and Energy)	MSc	Eng	UK
Waste management	Environmental Scientist, Waste	BSc	ES	UK
Waste management	Geotechnical Engineer: Waste Management and Design Projects - South Cheshire	BSc	Eng	UK
Waste management	Head of Waste & Resource Management	MSc	AES /AGS	UK
Waste management	Landfill and Quarry Engineer	MSc	Eng /GS	UK
Waste management	Landfill Engineer	MSc	Eng / ES	UK
Waste management	Waste and Mineral Planner	BSc	AES / AGS	UK
Waste management	Waste Procurement Consultant	BSc	Eng	UK
Waste management	Waste Project Manager	MSc	AES /AGS	UK
Waste management	Waste/CQA Engineer	BSc	AES / AGS	UK

Annex 7: Useful links for Jobs in Mineral Sciences-related careers

Name	MS-related academic profile	Website address	Comments	Access for search	Language
Elements (International magazine of mineralogy, geochemistry and petrology)	MS / AMS	http://www.elementsmagazine.org/jobpostings.htm	Jobs mainly in research or analytic instruments companies (international)	free	EN
Mineralogical Association of Canada (MAC)	MS / AMS	http://www.mineralogicalassociation.ca/index.php?p=40	Jobs in research (PhD and post-doc) and in production (mainly in Canada, USA)	free	EN
The Geochemical Society	MS / AMS	http://www.geochemsoc.org/news/joblinks/	Job announcements, postdoctoral opportunities, and funded student fellowships and assistantships (international)	free	EN
Society of Economic Geologists (SEG)	MS / AMS	http://www.segweb.org/students/	SEG Foundation Student fellowship and grants Programs (M.Sc. research)	free	EN
European Mineralogical Union (EMU)	MS / AMS	http://www.univie.ac.at/Mineralogie/EMU/	Links to job opportunities offered by the MS-related associations (Europe)	free	EN
The German Crystallographic Association (DGK)	MS	http://www.dgkristall2.de/	academic positions in Crystallography + links to similar websites	free	DE
European Crystallographic Association (ECA)	MS	http://www.ecanews.org/positions.php	Job opening, mainly in academic education and research (Europe)	free	EN
Minerals Engineering International online	AMS / Eng	http://www.min-eng.com/jobs/index.html	Jobs in mining and mineral processing (international)	free	EN
Global Info Mine	AMS / Eng	http://www.infomine.com/careers/	International job offers in mining and engineering, with advanced search	free search	EN
Jobs for Mining	AMS / AGS	http://www.jobs4mining.com/	A partnership between Minesite and Jobs4 Recruitment offers jobs news in general Geosciences related to mining (international)	free	EN
Career homepage of Society for Mining, Metallurgy, and Exploration (SME)	AMS / AGS	http://www.miningjobs.org/	Leading job resource for mining and mineral professionals (international)	free	EN
Mineral Economics & Management Society (MEMS) (USA)	AMS	http://www.minecon.com/	Jobs in minerals and materials industries, including resource, energy, and environmental issues (USA)	free	EN
European Synchrotron Radiation Facility (ESRF)	AMS / MatS	http://www.esrf.eu/	Research (PhD and post-doc level) positions at the ESRF (France)	free	EN
Science Magazine	GS / ES	http://sciencecareers.sciencemag.org/	General science career directory, incl. Environmental and Geosciences, with advanced search	free	EN
University of North Carolina Wilmington (USA)	GS / ES	http://www.uncwil.edu/stuaff/career/Majors/geology.htm	Excellent career information, advice and links to geology- and environmental science job websites	free	EN
University Utrecht, Faculty of Geosciences (NL)	GS / Eng	http://www.earthworks-jobs.com/acad.htm	Geoscience Research & Technical Jobs	free	EN

Name	MS-related academic profile	Website address	Comments	Access for search	Language
Total Jobs (UK)	GS / EarthS / ES	http://www.totaljobs.com/	General job offers, including special page for graduates, with advanced search (UK and Europe)	free	EN
Geology and Earth Science electronic magazine (USA)	GS / EarthS	http://geology.com/jobs.htm	Various news in Geo- and Earth Sciences, incl. career information and jobs, graduate studies offers (mainly in the USA)	free	EN
The Geological Society (UK)	GS / AGS	http://www.geolsoc.org.uk/gsl/site/GSL/joblistings	Geology-related job listings with improved search functions	free	EN
GeoSearch Inc.	GS / AGS	http://www.geosearch.com/	Geosciences-related jobs (mainly in USA+international)	free	EN
Hire Rocket (GeoWeb jobs)	GS / AGS	http://www.ggrweb.com/job.html	Geosciences-related jobs (USA)	free	EN
American Geological Institute (AGI)	GS / AGS	http://www.agiweb.org/careers.html	Guide to Geoscience careers and employers (mainly in the USA)	free	
Union Francaise des Geologues	GS / AGS	http://www.ufg.asso.fr/front/accueil.asp	Jobs in (applied) geological sciences	based on membership	FR
Geology jobs Itza list	GS / AGS	http://www.itzalist.com/bus/geology-jobs.html	Searches and helpful information such as job requirements, qualifications, and salary for careers and jobs in the field of geology	free	EN
EuroGeoSurveys (Association of the Geological Surveys of Europe)	GS / AGS	http://www.eurogeosurveys.org/career.html	Links to job opportunities offered by the 33 members of the association	free	EN
Yahoo groups - Geoscience Employment Opportunities	GS	http://tech.groups.yahoo.com/group/GeoSci-Jobs/	limited number of postings	free	EN
Bogy's Geology links (USA) - Geojobs	GS	http://www.geologylinks.com/jobs.html	Comprehensive list of links to Geology-related job listings	free	EN
Working Smart	AGS / Eng	http://www.working-smart.co.uk/	Specialist recruitment company solely for the global upstream oil and gas industry (incl. useful career advice)	free, upon registr.	
Energy Institute, UK	AGS / Eng	http://jobsearch.petroleum.monster.co.uk/	Jobs in Oil and gas industry	free	EN
International Association for Mathematical Geosciences (IAMG)	AGS	http://www.iamg.org/index.php/publisher/articleview/frmArticleID/190/	Jobs in Mathematical Geosciences, mainly in research (PhD and post-doc)	free	EN
Jobs in Public Sector (UK)	AGS	http://www.jobsinpublicsector.co.uk/	Public, charity and not for profit jobs: environment, governmental, libraries & museums	free	EN
Environmental Jobs and careers	ES / AES	http://www.ecoemploy.com/	Government jobs & environmental agencies (USA) + related links	free	EN
Environmental careers and opportunities	ES / AES	http://www.ecojobs.com/	500 environmental jobs (USA) including education, research, legal aspects	free	EN
ENDS Job search	ES / AES	http://www.endsjobsearch.co.uk/	More than 500 environmental-related jobs (UK, Europe, international)	free	EN
Environment Job	ES / AES	http://www.environmentjob.co.uk/	Environmental jobs, courses and events (UK, international)	free	EN
THINK Jobs.com	Eng / AGS	http://www.thinkjobs.com/	The most popular engineering staffing company (USA only)	free	EN

Name	MS-related academic profile	Website address	Comments	Access for search	Language
Worldwide Worker (energy jobs)	Eng / AGS	http://www.worldwideworker.com/energy-jobs/	International offers, including mining and engineering, with advanced search	free	EN
Earthworks	EarthS / AES	http://www.earthworks-jobs.com/	A very good website for jobs in general Earth Sciences, with topic-related search	free	EN
New Scientist Jobs	EarthS / ES	http://www.newscientistjobs.com/jobs/	Hundreds of science jobs, including Environmental & Earth Sciences, with advanced search	free	EN
MYGEO	EarthS /AEarthS	http://www.mygeo.info/geojobs.html	portal for useful information and tools related to Geography and Earth Science + many links to career openings websites (international)	free	DE
Nature Magazine	EarthS /AEarthS	http://www.nature.com/naturejobs/index.html	Science jobs worldwide with advanced search filter	free	EN
The Daily Galaxy (USA)	EarthS / ES	http://dailygalaxy.jobamatic.com/a/jobs/find-jobs	Jobs in Science, Technology and Green Sector (USA)	free	EN
European Science Foundation (ESF)	General (science)	http://www.esf.org/jobs/current-vacancies.html	Job opening in research within the ESF (Europe)	free	EN
The Association of Graduate Recruiters (UK)	General	http://www.agr.org.uk/	General career directory for graduates + studies for employers, HEI	based on membership	EN
Milkround Online	General	http://www.milkroundonline.com/	a network of recruitment sites and tools for UK recruiters	based on membership	EN
Europe Talent - Jobs for professionals (EU)	General	http://www.europetalent.com/home/index.php	Leading job site for professionals from Central & Eastern Europe, incl. Engineering - Petroleum, Mining & Marine	free search	EN
Sloan Career Cornerstone Center (USA)	General	http://www.careercornerstone.org/index.htm	Career planning resources in Science, Technology, Engineering etc.	free	EN
Europa information centre: European Personnel Selection Office	General	http://europa.eu/epso/index_en.htm	General career listing (EU)	free	EN
Graduate Careers and Jobs Listings	General	http://www.eurograduate.com/	Graduate Careers and Jobs Listings (incl. industry: mining, oil etc., education and research in Europe and worldwide)	free	EN, FR, DE

Annex 8: Directory of on-line digital resources for teaching/learning Mineral Sciences

Topic	Suggested Course/Module	Author (Person / Institution)	Homepage	Recommended study lines (programmes)						Recommended level (cycle)			
				MS	GS	EarthS	ES	MatS /Eng	CH	1st	2nd	3rd	
Laser Ablation (LA-ICPMS)	Analytical methods	Institute of Mineralogy, University of Würzburg	http://www.mineralogie.uni-wuerzburg.de/	x				x				x	
TOF-SIMS: Time Of Flight-Secondary Ion Mass Spectrometry	Analytical methods	Max Planck Institute for Solid State Research	http://www.fkf.mpg.de/ga/machines/sims/TOF_SIMS_short.html	x							x		
Scanning Electron Microscope	Analytical methods	Science Learning Network, Museum of Science Boston (USA)	http://www.mos.org/sln/SEM/	x	x	x	x	x			x		
About Imaging Spectroscopy	Analytical methods	Roger N. Clark, USGS (USA)	http://speclab.cr.usgs.gov/aboutimsp.html	x	x	x	x	x				x	x
Infrared Spectroscopy	Analytical methods	C. P. Sherman Hsu, Mallinckrodt, Inc.	http://www.prenhall.com/settle/chapters/ch15.pdf	x	x			x				x	x
Rruff Project	Analytical methods	Robert T Downs, The University of Arizona, The RRUFF Project	http://rruff.info/	x	x	x	x	x	x			x	x
TEM Basics (teaching & learning resources, with modelling facilities)	Analytical methods	Peter Goodhew, University of Liverpool	http://www.matter.org.uk/tem/	x				x				x	x
Teaching Analytical methods (collection of links on various topics)	Analytical methods	On the Cutting Edge Program for Faculty Development in the Earth Sciences (USA)	http://serc.carleton.edu/research_education/geochemsheets/index.html	x	x		x		x	x			
Analytical methods resources for teaching at undergraduate and graduate level (collection of links)	Analytical methods	Digital Library for Earth System Education (DLSE, USA)	http://www.dlese.org/library/index.jsp	x	x	x	x	x	x	x			
Mineral Spectroscopy	Analytical methods	California Institute of Technology	http://minerals.gps.caltech.edu/	x				x			x	x	
Topology and Geometry Software	Computing mineralogy	Jeff Weeks'	http://geometrygames.org/	x				x			x	x	
Crystallography resources for teaching at undergraduate and graduate level (collection of links)	Crystallography	Digital Library for Earth System Education (DLSE, USA)	http://www.dlese.org/library/index.jsp	x	x	x					x		
Economic geology resources for teaching at undergraduate and graduate level (collection of links)	Economic geology	Digital Library for Earth System Education (DLSE, USA)	http://www.dlese.org/library/index.jsp	x	x	x					x		
Virtual Atlas of Opaque and Ore Minerals in their Associations	Economic geology	Robert A. Ixer, Paul R. Duller & SME (Society for Mining, Metallurgy and Exploration)	http://www.smenet.org/opaque-ore/	x	x						x	x	
eFunda Engineering fundamentals	Engineering geology	eFunda online publisher	http://www.efunda.com/home.cfm	x			x				x	x	x
MERLOT Engineering portal	Engineering geology	MERLOT Engineering Community (USA)	http://www.merlot.org/merlot/materials.htm										
Environmental geology	Environmental mineralogy	John DuNann Winter, Whitman College	http://www.whitman.edu/geology/winter/	x	x	x	x				x		
Gems and Gem minerals	Gemology	Dept. of Geological Sciences, University of Texas, Austin	http://www.geo.utexas.edu/courses/347k/	x	x	x			x		x	x	

GEMROCKS: Ornamental & Curio Stones	Gemology	R. V. Dietrich	http://www.cst.cmich.edu/users/dietr1rv/geomrx.htm	x	x				x	x		
MINABS Online	General Mineral Sciences	Mineralogical Society of Great Britain & Ireland (MSA)	http://www.minabs.com/	x	x	x	x	x	x		x	x
PetDB Database (Information System for Geochemical Data of Igneous and Metamorphic Rocks from the Ocean Floor)	Geochemistry	EarthChem (National Science Foundation, USA)	http://www.petdb.org/petdbWeb/index.jsp	x	x						x	x
Geochemical Earth Reference Model (GERM)	Geochemistry	EarthRef Data and Models Team (USA)	http://earthref.org/GERM/	x	x	x	x				x	x
GEOROC database: Geochemistry of rocks, oceans and continents	Geochemistry	MPI für Chemie, Mainz, Germany	http://georoc.mpch-mainz.gwdg.de/georoc/	x	x		x				x	x
Enduring Resources for Earth Sciences Education (ERESE)	Geochemistry	EarthRef Data and Models Team (USA)	http://earthref.org/ERESE/		x	x				x	x	
North American Volcanic and Intrusive Rock Database (NAVDAT)	Geochemistry	EarthChem (National Science Foundation, USA)	http://navdat.kgs.ku.edu/	x	x						x	x
GEOKEM: Geochemistry of Igneous Rocks	Geochemistry	Bernard M Gunn	http://www.geokem.com/index.html	x	x						x	x
Geochemistry of igneous rocks from the PLUTO database	Geochemistry	Mineral Resources Program (MRP) of the U.S. Geological Survey	http://tin.er.usgs.gov/pluto/igneous/	x	x						x	x
Marine Geology Data: PETROS Igneous Petrology Databank	Geochemistry	Dr. Felix Mutschler, Eastern Washington State University (USA)	http://www.ngdc.noaa.gov/mgg/geology/petros.html	x	x						x	x
IGBA - IGneous data BAse - Global Database in Igneous Petrology	Geochemistry	Kaichiro Yamamoto, Koka Women's College, Kyoto (Japan)	http://www.koka.ac.jp/yamamoto/igba/igba.htm	x	x						x	x
Teaching Geochemistry (collection of links on various topics)	Geochemistry	On the Cutting Edge Program for Faculty Development in the Earth Sciences (USA)	http://serc.carleton.edu/NAGTWorkshops/geochemistry/table_contents.html	x	x	x	x		x	x	x	
Geochemistry resources for teaching at undergraduate and graduate level (collection of links)	Geochemistry	Digital Library for Earth System Education (DLSE, USA)	http://www.dlese.org/library/index.jsp	x	x	x				x		
Radioactive minerals	Hazardous minerals	Atomic Rocks website	http://www.atomicrocks.com/index3.htm	x	x		x				x	x
Volcanoes and volcanology	Igneous petrology	Department of Geosciences at Oregon State University	http://volcano.und.edu/volcanoes.html	x	x	x					x	x
Volcanology	Igneous petrology	Michigan Technological University	http://www.geo.mtu.edu/volcanoes/	x	x	x	x				x	
Materials and Mineral Sciences	Mineralogy	Univ. of Cambridge, Dept. of Materials Science and Metallurgy	http://www.msm.cam.ac.uk/Teaching/matmin1a/index.html	x				x			x	
The Photo-Atlas of Minerals (DVD)	Mineralogy	Los Angeles County Museum of Natural History	http://www.nhm.org/pam/	x	x	x	x		x			
Mineralogy 4 Kids	Mineralogy	Mineralogical Society of America (MSA)	http://www.minsocam.org/MSA/K12/K_12.html	x							x	
MINERAL IDENTIFICATION KEY II	Mineralogy	Alan Plante, Donald Peck & David Von Bargen (Collector's Corner)	http://www.minsocam.org/MSA/collectors_corner/id/mineral_id_key1.htm	x	x						x	

MINDAT: Mineralogy Database	Mineralogy	Jolyon & Ida Ralph (MinDat)	http://www.mindat.org/	x	x					x	x		
WEBMINERAL: Mineralogy Database	Mineralogy		http://webmineral.com/	x	x					x	x		
Teaching Mineralogy (collection of links on various topics)	Mineralogy	On the Cutting Edge Program for Faculty Development in the Earth Sciences (USA)	http://serc.carleton.edu/NAGTWorkshops/mineralogy/table_contents.html	x	x	x	x			x	x	x	
Mineralogy resources for teaching at undergraduate and graduate level (collection of links)	Mineralogy	Digital Library for Earth System Education (DLSE, USA)	http://www.dlese.org/library/index.jsp	x	x	x					x		
General teaching (secondary school and possibly undergraduate level)	Mineralogy	The Association for Science Education (ASE, UK)	http://www.schoolscience.co.uk/	x	x	x	x				x		
The Virtual Museum of Minerals and Molecules	Mineralogy	P. Barak, Ed Nater, & C. Stiles, The Minerals & Molecules Project	http://virtual-museum.soils.wisc.edu/	x			x	x			x		
Mineralogy	Mineralogy	Bill Cordua, Univ. of Wisconsin at River Falls	https://falconfile.uwrf.edu/home/W1014120/personalweb/Minerals.html	x	x	x	x	x		x	x		
Optical mineralogy	Mineralogy	Mickey Gunter, University of Idaho, Moscow	http://www.webpages.uidaho.edu/~mgunter/opt_min/opt_min.html	x	x		x				x	x	
Mineralogy	Mineralogy	John DuNann Winter, Whitman College	http://www.whitman.edu/geology/winter/	x	x	x				x	x		
Minerals under the Microscope	Mineralogy	Charlotte Gladstone, Paul Bro, University of Bristol	http://www.gly.bris.ac.uk/www/teach/opmin/mins.html	x	x			x		x	x	x	
Unconventional Platinum Group Minerals	Mineralogy	Jaques Jedwab, Université Libre de Bruxelles	http://www.ulb.ac.be/sciences/upgm/mguide/	x	x							x	x
Zeolite structures database	Mineralogy	Structure Commission of the International Zeolite Association	http://www.iza-structure.org/databases/	x	x		x					x	x
Cave minerals	Mineralogy	Djuna Bewley, Dave Bunnell, The Virtual Cave	http://www.goodearthgraphics.com/virtcave/	x	x	x	x				x	x	
Mineral and mining information (introductory level)	Mining mineralogy	Mineral Information Institute (MII) (USA)	http://www.mii.org/	x	x			x			x		
Petrology and Mineralogy in ARD prediction	Mining mineralogy	Shannon Shaw, Chris Mills (Global Infomine website)	http://technology.infomine.com/enviromine/ard/Mineralogy/Petrology%20and%20Mineralogy.htm	x	x			x				x	
Engineering and Environmental Simulation Software for Mining Industry	Mining mineralogy	GoldSim Technology Group	http://www.goldsim.com/Downloads/WhitePapers/MineEvaluation.pdf	x	x			x			x	x	x
Minerals-based sustainable development – one viable alternative	Mining mineralogy	Ericsson, M, Noras, P.	http://www.infomine.com/publications/docs/Ericsson2005.pdf	x	x			x			x	x	x
Teaching Petrology (collection of links on various topics)	Petrology	On the Cutting Edge Program for Faculty Development in the Earth Sciences (USA)	http://serc.carleton.edu/NAGTWorkshops/petrology/teaching_activities_table_contents.html	x	x	x	x			x	x	x	
Petrology resources for teaching at undergraduate and graduate level (collection of links)	Petrology	Digital Library for Earth System Education (DLSE, USA)	http://www.dlese.org/library/index.jsp	x	x	x					x		
Petrology	Petrology	John DuNann Winter, Whitman College	http://www.whitman.edu/geology/winter/	x	x					x	x		
Teaching Petrology (collection of links on various topics)	Petrology		http://serc.carleton.edu/NAGTWorkshops/petrology/index.html	x	x						x	x	
Granitic rocks	Petrology	Robert M. Reed, University of Texas at Austin	http://uts.cc.utexas.edu/~rmm/index.html	x	x						x	x	

Physical Geology	Physical geology	John DuNann Winter, Whitman College	http://www.whitman.edu/geology/winter/	x	x	x				x		
Physics and Chemistry of Earth and Planetary Materials	Planetary mineralogy	Univ. of Cambridge, Dept. of Materials Science and Metallurgy	http://rock.esc.cam.ac.uk/ibminsci/Course_Outline_files/IB%20MinSci%202007%20Course%20Guide.pdf	x				x		x		
Planetary science	Planetary mineralogy	Planetary Science Research Discoveries (PSRD, USA)	http://www.psrds.hawaii.edu/index.html	x		x				x	x	
Teaching Phase equilibria (collection of links on various topics)	Thermodynamics	On the Cutting Edge Program for Faculty Development in the Earth Sciences (USA)	http://serc.carleton.edu/research_education/equilibria/index.html	x				x			x	