



1. General information

Course: MINERAL DEPOSITS

Type: CORE COURSE

Degree: 384 - MINING AND ENERGY ENGINEERING DEGREE

Center: 106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING

Year: 3

Main language: English

Use of additional
languages:

Web site:

Code: 19522

ECTS credits: 6

Academic year: 2023-24

Group(s): 51 54

Duration: First semester

Second language: Spanish

English Friendly: N

Bilingual: Y

Lecturer: PABLO LEON HIGUERAS HIGUERAS - Group(s): 54				
Building/Office	Department	Phone number	Email	Office hours
EIMI Almadén, Ed. Storr, planta 1ª	INGENIERÍA GEOLÓGICA Y MINERA	926052709	pablo.higueras@uclm.es	
Lecturer: SATURNINO LORENZO ALVAREZ - Group(s): 51				
Building/Office	Department	Phone number	Email	Office hours
Edificio STORR, Planta Primera, Despacho 1.02	INGENIERÍA GEOLÓGICA Y MINERA	926264007 Ext 6017	saturnino.lorenzo@uclm.es	

2. Pre-Requisites

In order to adequately achieve the objectives set, prior training is required in the following aspects:

General Chemistry

Mineralogy and Petrology

General and Applied Geology

3. Justification in the curriculum, relation to other subjects and to the profession

The Ore Deposits (OD) course provides to the Degree the basic and applied knowledge for the study of the minerals and rocks concentrations that constitute the Ore Deposits. In turn, the best knowledge of the OD is based on knowledge of Mineralogy, Petrography and General and Applied Geology. It is also directly related to subjects such as the Mining Research, which deals with the techniques used in the prospection of the OD, and with Geophysics and Geochemistry, which broadens the knowledge of the previous one. Likewise, it also provides the foundations of the Mining Exploitation Technology, since the evaluation, planning and mining design must lay its foundations in the correct identification of the characteristics and properties of the OD: size, morphology, mineralogical composition and geochemical variations, etc., all parameters that must come from a detailed study of the Geology of the Ore Deposits to be put into operation. The mining environmental technology must also be awarded about the detailed characteristics of the OD to propose an adequate management of its wastes, identify the risks involved in its exploitation, and ultimately, to evaluate the risks implicit in the particular exploitation technology appropriate for each mineral deposit in particular.

4. Degree competences achieved in this course

Course competences	
Code	Description
A10	Technical and scientific capacity for the profession of Technical Mining Engineer and knowledge of the duties of consultancy, analysis, design, calculation, project, construction, maintenance, preservation and exploitation.
A11	To understand the multiple legal and technical restrictions which are to be considered in the Mining Engineering field and which are intended, according to what it was established in part 5 of the ministerial order CIN/306/2009 of 09-02-2009, the prospection and mining-geological research, all kind of geological exploitations including ground water, underground works, underground storage, treatment and processing plants, energy plants, metallurgical as well as iron and steel plants, building material plants, carbon and chemical, petrochemical, gas, waste treatment plants and effluents, explosive factories, and capacity to use verified methods and recognized technologies with the aim of getting the highest efficacy having environmental concern and protecting the health and security of workers and users of those facilities.
A16	To carry out in the mining engineering field, according to the acquired knowledge established in section 5 of order CIN/306/2009 (9-02-2009), measurements, layout plans, maps and plans, calculations, assessment, risk analysis, experts' reports, studies and reports, work plans, environmental and social studies, restoration plans, quality control systems, prevention systems, analysis and assessment of metallic, ceramic, refractory, synthetic and other materials and properties, ground characterization and rocky mountain ranges and similar works.
A17	To know, understand and apply the necessary legislation in the professional field of the Technical Mining Engineer.
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant

CB03	social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CT00	To promote respect and promotion of Human Rights as well as global access principles and design for everybody according to the 10th final order of the Law 51/2003 of December 2nd, about equal opportunities, non-discrimination and universal accessibility for people with disabilities.
CT01	To master a foreign language, B1 level following the Common European Framework of Reference for Languages.
CT02	To be acquainted with Information and Communication Technology ICT
CT03	Capacity for written and oral communication skills.
CT04	Capacity to accept ethical and deontological professional responsibility.
D01	Capacity to know, understand and use the principles of modelling deposits.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To know and understand the geological processes which shape mineral deposits

To know, understand and apply assessment techniques of the mineral deposits

To know, understand and apply bibliography search processes which might be necessary to supplement the required data about mineral deposits.

Critical and reasoning capacity

Capacity to understand maps and geological sections related to mineral deposits

Capacity to express yourself correctly both in spoken and in written form .

Capacity to integrate mining and geological data as well as environmental data

Additional outcomes

6. Units / Contents

Unit 1: Concept of ore deposit. Genesis of ore deposit.

Unit 2: Methods for studying ore deposits

Unit 3: Classification of ore deposits

Unit 4: Erosion and transport processes forming rocks and ore deposits

Unit 5: Rocks and ore deposits formed as a result of erosion

Unit 6: Detritic sedimentary rocks

Unit 7: Biogeochemical rocks and related ore deposits

Unit 8: Rocks and Ore Deposits formed by chemical precipitation

Unit 9: Rocks of organic origin: Natural Hydrocarbons and Coal

Unit 10: Ortomagmatic rocks and ore deposits

Unit 11: Rocks and ore deposits related with volcanism

Unit 12: - Postmagmatic Processes and related Ore Deposits

Unit 13: Metamorphism and Ore Deposits

Unit 14: Exploration of Ore Deposits

Unit 15: Mining exploitation of Ore Deposits

Unit 16: Mining and Environmental Concerns

ADDITIONAL COMMENTS, REMARKS

Two additional seminars:

- Strecken classification of igneous rocks.

- The Granite: The paradigm of Industrial rock.

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	A10 A11 A17 CB01 CB02 CB03 CB05 CT00 CT01 CT02 CT03 D01	1.2	30	N		Participatory master class, with the use of audiovisual media, blackboard, videos, etc. Use of the Virtual Campus Moodle Platform as support for teacher-student communication and obtaining information for the preparation of notes, preparation of classes and issuance of documents.
Field work [ON-SITE]	Practical or hands-on activities	A10 CB01 CB02 CB03 CB04 CB05 CT04 D01	0.3	7.5	Y	N	Field work, with visits to mineral deposits of interest. Collaboration with operating companies. Evaluation by preparing a report on the visit.
Laboratory practice or sessions [ON-SITE]	Problem solving and exercises	A10 A11 CB01 CB02 CB03 CB04 CB05 CT02 CT03 D01	0.4	10	N		Use of ore deposit evaluation programs. Preparation of reports.
							Preparation of summaries of the topics of the program and supervision of the same by the

Writing of reports or projects [OFF-SITE]	Self-study	A10 A11 A17 CB02 CB03 CB04 CB05 CT02 CT03 D01	0.4	10	Y	Y	teacher. Preparation of a bibliographical work as an extension of one of the topics of the program, or based on a real case. Use of documentation from the Virtual Campus platform and bibliographic material, partly to be obtained through the Internet.
Study and Exam Preparation [OFF-SITE]	Self-study	A10 A11 A17 CB01 CB02 CB03 CB04 CB05 CT02 CT03 CT04 D01	3.2	80	N	-	Autonomous personal study of the student and supervised work. Use of the Virtual Campus Moodle Platform as a support for communication - obtaining information for the preparation of notes - issuance of documents. Use of the INTERNET for complementary documentation.
Individual tutoring sessions [ON-SITE]	Other Methodologies	A10 A17 CB01 CB02 CB03 CB04 CB05 CT03 CT04 D01	0.1	2.5	N	-	161 / 5.000 Resultados de traducción Individualized tutorials, with direct and virtual teacher-student interaction. Use of the Virtual Campus Moodle Platform as support for communication.
Group tutoring sessions [ON-SITE]	Group tutoring sessions	A10 A11 A17 CB01 CB02 CB03 CB04 CB05 CT03 CT04 D01	0.1	2.5	N	-	Group tutorials, with direct and virtual teacher-student interaction, fundamentally referring to practical work. Use of the Virtual Campus Moodle Platform as support for communication.
Final test [ON-SITE]	Assessment tests	A10 A11 A17 CB01 CB02 CB03 CB04 CB05 CT00 CT02 CT03 CT04 D01	0.2	5	Y	Y	Theoretical and practical tests of applied evaluation of the acquired knowledge.
Problem solving and/or case studies [ON-SITE]	Cooperative / Collaborative Learning		0.1	2.5	N	-	Approach and group resolution of a classification of a mineral deposit.
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System			
Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Final test	50.00%	50.00%	Continuous evaluation, based on attendance at theoretical and practical classes and on practical work.
Theoretical papers assessment	30.00%	40.00%	Preparation of a work based on a case study, with bibliographic information, or as far as possible, from the productive sector.
Practicum and practical activities reports assessment	20.00%	10.00%	Preparation and oral presentation of a report of the practical work carried out.
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

The evaluation of the indicated items will be based on the following criteria:

- Final examination: It will be a final knowledge test, including expository questions and test-type questions based on the information transmitted by the teacher on the available class topics in the Virtual Campus and during the theoretical classes. The adequacy of the knowledge to the imparted will be valued, as well as, very positively, the original founded contributions of the student.
- Elaboration of theoretical works. Including a work based on a case study: The work delivered by the student will be assessed based on its total length (which must be between 20 and 30 pages), its originality and the personal assessment contributions by the student. Summaries of class topics: They must be of a maximum length of 2 pages, and will consist of summaries prepared by the student on aspects related to the subject in question. The evaluative personal contributions of the student will be valued.
- Preparation and oral presentation of a report of the practical work: it must report adequately on the work done and the results obtained, and will be presented clearly and concisely to the teacher and the rest of the students in the course.

Non-continuous evaluation:

The evaluation of the indicated items will be based on the following criteria:

- Final test: It will be a final knowledge test, similar to the continuous assessment
- Elaboration of theoretical works - Work based on a study case that will be valued the same as for the continuous evaluation.

Specifications for the resit/retake exam:

It will include a knowledge test, although the results obtained in the other items in the ordinary call will be evaluated as much as possible. In the event that these contributions by the student could not be assessed because they were not previously submitted to the teacher, the grade will be for a maximum of 6 points.

Specifications for the second resit / retake exam:

The special call for retake exam will be assessed on the basis of a knowledge test, in accordance with the same criteria that are expressed for ordinary calls.

9. Assignments, course calendar and important dates**Not related to the syllabus/contents**

Hours	hours
Field work [PRESENCIAL][Practical or hands-on activities]	15
Laboratory practice or sessions [PRESENCIAL][Problem solving and exercises]	10
Writing of reports or projects [AUTÓNOMA][Self-study]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	15
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	2.5
Final test [PRESENCIAL][Assessment tests]	5

Unit 1 (de 16): Concept of ore deposit. Genesis of ore deposit.

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Writing of reports or projects [AUTÓNOMA][Self-study]	.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	2
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.1

Unit 2 (de 16): Methods for studying ore deposits

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Writing of reports or projects [AUTÓNOMA][Self-study]	.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	2
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.1

Unit 3 (de 16): Classification of ore deposits

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	2
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.1

Unit 4 (de 16): Erosion and transport & processes forming rocks and ore deposits

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.1

Unit 5 (de 16): Rocks and ore deposits formed as a result of erosion

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.1

Unit 6 (de 16): Detritic sedimentary rocks

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.2

Unit 7 (de 16): Biogeochemical rocks and related ore deposits

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.1

Unit 8 (de 16): Rocks and Ore Deposits formed by chemical precipitation

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.2

Unit 9 (de 16): Rocks of organic origin: Natural Hydrocarbons and Coal

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.25

Unit 10 (de 16): Ortomagmatic rocks and ore deposits

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.3

Unit 11 (de 16): Rocks and ore deposits related with volcanism	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.25
Unit 12 (de 16): - Postmagmatic Processes and related Ore Deposits	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.25
Unit 13 (de 16): Metamorphism and Ore Deposits	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.1
Unit 14 (de 16): Exploration of Ore Deposits	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	1
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.1
Unit 15 (de 16): Mining exploitation of Ore Deposits	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	1
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.15
Unit 16 (de 16): Mining and Environmental Concerns	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Writing of reports or projects [AUTÓNOMA][Self-study]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	1
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	.1
Global activity	
Activities	hours
Final test [PRESENCIAL][Assessment tests]	5
Class Attendance (theory) [PRESENCIAL][Lectures]	25
Field work [PRESENCIAL][Practical or hands-on activities]	15
Group tutoring sessions [PRESENCIAL][Group tutoring sessions]	2.5
Laboratory practice or sessions [PRESENCIAL][Problem solving and exercises]	10
Writing of reports or projects [AUTÓNOMA][Self-study]	30
Study and Exam Preparation [AUTÓNOMA][Self-study]	60
Individual tutoring sessions [PRESENCIAL][Other Methodologies]	2.5
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Bateman, Alan M.	Yacimientos minerales de rendimiento económico	Omega		84-282-0030-0	1982	In Spanish
Orche García, Enrique	Manual de evaluación de yacimientos minerales	Carlos López Jimeno		84-921708-9-1	1999	In Spanish.
Orche García, Enrique	Manual de geología e investigación de yacimientos minerales	[E.T.S.I. Minas. Universidad Politécnica]		84-931292-7-5	2001	In Spanish.
Society for Geology Applied to Mineral Deposits. Bienial M	Current research in geology applied to ore deposits : procee	Departamento de Mineralogía y Petrología, Unive		84-338-1772-8	1993	
	YACIMIENTOS minerales : técnicas de estudio, tipos, evolució	Centro de Estudios Ramón Areces		84-87191-74-6	1991	In Spanish.
J.M. Guilbert and Ch.F. Park	The Geology of Ore Deposits	Waveland Pr Inc		1577664957	2007	