



# UNIVERSIDAD DE CASTILLA - LA MANCHA

## GUÍA DOCENTE

### 1. General information

**Course:** GEOPHYSICS AND GEOCHEMISTRY  
**Type:** ELECTIVE  
**Degree:** 384 - MINING AND ENERGY ENGINEERING DEGREE  
**Center:** 106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING  
**Year:** 4

**Main language:** Spanish  
**Use of additional languages:**  
**Web site:**

**Code:** 19530  
**ECTS credits:** 6  
**Academic year:** 2023-24  
**Group(s):** 51  
**Duration:** C2  
**Second language:** English  
**English Friendly:** Y  
**Bilingual:** N

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### 2. Pre-Requisites

Previous knowledge of  
Physics and Chemistry  
General and Applied Geology  
Mineralogy and Petrology.  
Mineral Deposits.  
Mathematics.  
Handling of material used in prospecting and mining research.

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

Geophysics and Geochemistry is a subject that complements the knowledge of Mining Research and Mineral Deposits. At specifically, it provides a better knowledge of the geophysical and geochemical techniques used in Mineral Prospecting, as well as in other fields of Earth Sciences, by improving the understanding of the internal structure of the Earth Sciences, by improving the understanding of the internal structure of the Earth and the chemical processes that affect it.

### 4. Degree competences achieved in this course

#### Course competences

Code	Description
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 prospecting 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.
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.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant 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.
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.

E03	Capacity to know, understand and use the principles of mineralogical sampling, petrographic and geotechnical. Sampling techniques
E14	Capacity to know, understand and apply the principles of geophysics and geochemistry prospection.

## 5. Objectives or Learning Outcomes

### Course learning outcomes

#### Description

To know how to design and organize prospection and mining research campaigns

To acquire the skills to handle equipment and software tools to develop mining research methodologies

To be able to use bibliography and documentation to write reports and practical assignments

To be able to express yourself using a minimum vocabulary to communicate in the professional world of mining research

To make progress in the knowledge of the main methods of prospection, geophysics and geochemistry, applied to different fields in mining research as well as selection of suitable methods for basic campaign related to this activity.

## 6. Units / Contents

**Unit 1: Geochemistry as a basic science in reservoir exploration**

**Unit 2: Modalities of geochemistry and their rationale**

**Unit 3: Strategic or drainage network geochemistry**

**Unit 4: Tactical or Soil Geochemistry Other types of geochemistry: atmosphere, water, vegetation**

**Unit 5: Other types of geochemistry: atmosphere, water, vegetation**

**Unit 6: Geochemical analysis. Main techniques**

**Unit 7: Interpretation of geochemical data**

**Unit 8: Geophysical prospecting**

**Unit 9: Applied Gravimetry**

**Unit 10: Applied seismic**

**Unit 11: Geo-electrical methods. Applications.**

**Unit 12: Geophysical logging in the earth sciences.**

**Unit 13: Other geophysical methods**

**Unit 14: Practical field application seminar.**

## 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	A11 CB01 CB02 CB03 CB04 CB05 CT00 CT02 CT03 CT04 E03 E14	1.08	27	N	-	
Problem solving and/or case studies [ON-SITE]	project-based learning	A11 CB01 CB02 CB03 CB04 CB05 CT00 CT02 CT03 CT04 E03 E14	0.92	23	Y	N	
Workshops or seminars [ON-SITE]	Guided or supervised work	A11 CB01 CB02 CB03 CB04 CB05 CT00 CT02 CT03 CT04 E03 E14	0.4	10	Y	N	
Writing of reports or projects [OFF-SITE]	Self-study	A11 CB01 CB02 CB03 CB04 CB05 CT00 CT02 CT03 CT04 E03 E14	3.6	90	Y	Y	
<b>Total:</b>			<b>6</b>	<b>150</b>			
			<b>Total credits of in-class work: 2.4</b>		<b>Total class time hours: 60</b>		
			<b>Total credits of out of class work: 3.6</b>		<b>Total hours of out of class work: 90</b>		

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
Practicum and practical activities reports assessment	70.00%	30.00%	The internship reports will be used to assess the student's learning of theory and practice of the student. The report shall include the report on the workshop or seminar.
Assessment of problem solving and/or case studies	30.00%	0.00%	Execution and resolution of problems and special cases
Final test	0.00%	70.00%	Resolution of practical cases
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

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:

For those students who have not handed in the practical reports, a final test will be held, which will consist of a series of exercises whose subject matter will try to cover most of the aspects of the subject, establishing the evaluation scales in each question and whose assessment will be

100%

**Non-continuous evaluation:**

It will have two parts. The first part will consist of the evaluation of the internship report and the second part will consist of a final test composed of a series of exercises whose subject matter will deal with a series of questions.

The second part will consist of a final test composed of a series of exercises whose subject matter will try to cover most of the aspects developed in the course.

**Specifications for the resit/retake exam:**

It will have two parts. The first part will consist of the evaluation of the internship report and the second part will consist of a final test composed of a series of exercises whose subject matter will deal with a series of questions.

The second part will consist of a final test composed of a series of exercises whose subject matter will try to cover most of the aspects developed in the course.

**Specifications for the second resit / retake exam:**

It will have two parts. The first part will consist of the evaluation of the internship report and the second part will consist of a final test composed of a series of exercises whose subject matter will deal with a series of questions.

The second part will consist of a final test composed of a series of exercises whose subject matter will try to cover most of the aspects developed in the course.

9. Assignments, course calendar and important dates	
<b>Not related to the syllabus/contents</b>	
<b>Hours</b>	<b>hours</b>
Problem solving and/or case studies [PRESENCIAL][project-based learning]	23
Writing of reports or projects [AUTÓNOMA][Self-study]	90
<b>Unit 1 (de 14): Geochemistry as a basic science in reservoir exploration</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	1
<b>Unit 2 (de 14): Modalities of geochemistry and their rationale</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	1
<b>Unit 3 (de 14): Strategic or drainage network geochemistry</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	2
<b>Unit 4 (de 14): Tactical or Soil Geochemistry Other types of geochemistry: atmosphere, water, vegetation</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	2
<b>Unit 5 (de 14): Other types of geochemistry: atmosphere, water, vegetation</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	2
<b>Unit 6 (de 14): Geochemical analysis. Main techniques</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	2
<b>Unit 7 (de 14): Interpretation of geochemical data</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	2
<b>Unit 8 (de 14): Geophysical prospecting</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	1
<b>Unit 9 (de 14): Applied Gravimetry</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	2
<b>Unit 10 (de 14): Applied seismic</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	3
<b>Unit 11 (de 14): Geo-electrical methods. Applications.</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	4
<b>Unit 12 (de 14): Geophysical logging in the earth sciences.</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	4
<b>Unit 13 (de 14): Other geophysical methods</b>	
<b>Activities</b>	<b>Hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	1
<b>Unit 14 (de 14): Practical field application seminar.</b>	
<b>Activities</b>	<b>Hours</b>
Workshops or seminars [PRESENCIAL][Guided or supervised work]	10
<b>Global activity</b>	
<b>Activities</b>	<b>hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	27
Problem solving and/or case studies [PRESENCIAL][project-based learning]	23
Workshops or seminars [PRESENCIAL][Guided or supervised work]	10
Writing of reports or projects [AUTÓNOMA][Self-study]	90
<b>Total horas: 150</b>	

## 10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Deutsch, William J.	Groundwater geochemistry : fundamentals and application	Lewis Publishers		0-87371-308-7	1987	
Dobrin Milton	Introduction to Geophysical Prospecting				1984	
Fyfe, W. S.	Introducción a la geoquímica	Reverté		84-291-7171-1	1981	
Heling, D.	Sediments and environmental geochemistry : selected aspect			3-540-51735	1990	
Cantos Figuerola, J.	Tratado de Geofísica Aplicada				1975	
Dominique Chapelier	Diagrafías Aplicadas a la Hidrogeología	Lavoisier			1987	
López Ruiz, José	Geoquímica de los procesos magmáticos	Rueda		84-7207-061-1	1990	
Orellana E.	Corriente continua (tomo I) y Prospección Geoeléctrica en Corriente variable (tomo II)	Omega			1982	
Telford et al.	Applied Geophysics	Cambridge University Press			2004	
Albaréde, Francis	Geochemistry : an introduction	University Press		978-0-521-70693-3	2009	
Schlumberger Cia.	Interpretación de Perfiles. Fundamentos y Aplicaciones				1990	
Rose Arthur, W.	Geochemistry in mineral exploration	Academic Press		0-12-596252-5	1990	
	Exploration geochemistry, design and interpretation of soil	Society of Economic Geologists		0-9613074-2-0	1986	
Astier, J.L.	Geofísica Aplicada a la Hidrogeología	Paraninfo			1982	
	Treatise on geochemistry	Elservier/Pergamon		0-08-043751-6	2004	
	Modern analytical geochemistry : an introduction to quantiti	Longman		0-582-09944-7	1997	
Nettleton et al.	Gravity and Magnetism in oil prospecting				1976	