



1. General information

Course: EXPLORATION TECHNOLOGY

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: 19559

ECTS credits: 6

Academic year: 2022-23

Group(s): 51

Duration: C2

Second language:

English Friendly: Y

Bilingual: N

Lecturer: LUIS MANSILLA PLAZA - Group(s): 51

Building/Office	Department	Phone number	Email	Office hours
Laboratorio de Ciencias de la Tierra. Primera planta edificio Störr	INGENIERÍA GEOLÓGICA Y MINERA	6002	luis.mansilla@uclm.es	The following will be assigned at the beginning of the academic year

2. Pre-Requisites

It is a subject with no established requirements, but it would be advisable for the student to have passed the subjects related to geology, mining research, mineral deposits, etc.

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

Among the many tools that a graduate in the mining branch must use and know are drilling techniques by means of boreholes, which will allow them to work in the fields of mining research, exploration and exploitation of hydrocarbons, geology, mine exploitation, etc. This is a very useful and versatile subject that is an ideal complement to achieve the competences of the mining engineer.

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. 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.
A11	
A13	Capacity to design, plan, operate, inspect, sign and manage projects, plants or installations in their field.
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.
E12	Capacity to know, understand and use the principles of design, planning and execution for the prospection and extraction of minerals, rocks, fossil fuels, nuclear fuel, underground waters and geotechnical. Design, execution and planning for fluid injection in underground structures

5. Objectives or Learning Outcomes

Course learning outcomes

Description

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

Capacity to plan, manage and run drilling the mining field, underground water, geotechnics, hydrocarbons and fluid injection.

To express yourself with a minimum vocabulary in the professional drilling field

To know and understand the basic principles which shape drilling investigation in the mining field, underground water, hydrocarbons and geotechnics

6. Units / Contents

Unit 1: Introduction. General information
Unit 2: Percussion Drilling
Unit 3: Rotopercussive drilling
Unit 4: Rotational drilling
Unit 5: Rotation drilling with core recovery
Unit 6: Directional drilling
Unit 7: Safety and environment in drilling
Unit 8: Applications for groundwater abstraction
Unit 9: Applications for geological-mining research
Unit 10: Applications for hydrocarbon research
Unit 11: Civil engineering applications

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 A13 CB01 CB02 CB03 CB04 CB05 CT00 CT02 CT03 CT04 E12	0.79	19.75	N	-	
Class Attendance (practical) [ON-SITE]	Combination of methods	A10 A11 A13 CB01 CB02 CB03 CB04 CB05 CT00 CT02 CT03 CT04 E12	0.5	12.5	Y	N	
Other on-site activities [ON-SITE]	Case Studies	A10 A11 A13 CB01 CB02 CB03 CB04 CB05 CT00 CT02 CT03 CT04 E12	0.6	15	Y	N	
Study and Exam Preparation [OFF-SITE]	Self-study	A10 A11 A13 CB01 CB02 CB03 CB04 CB05 CT00 CT02 CT03 CT04 E12	3.6	90	N	-	
Individual tutoring sessions [ON-SITE]	Guided or supervised work	A10 A11 A13 CB01 CB02 CB03 CB04 CB05 CT00 CT02 CT03 CT04 E12	0.26	6.5	N	-	
Final test [ON-SITE]	Assessment tests	A10 A11 A13 CB01 CB02 CB03 CB04 CB05 CT00 CT02 CT03 CT04 E12	0.25	6.25	Y	Y	
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
Practicum and practical activities reports assessment	15.00%	15.00%	Resolution and delivery of practical exercises carried out in class.
Other methods of assessment	15.00%	15.00%	Proposal of solutions to typical cases in the world of the surveys studied by the students.
Final test	70.00%	70.00%	Final examination eminently practical and applied to the world of drilling.
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 continuous assessment of the subject will consider: the value obtained in the final exam (this exam 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), the work and practices elaborated throughout the course, and the results of the final exam.

Non-continuous evaluation:

The non-continuous evaluation of the course will include the final exam, where there will be an exercise of the typical cases of the world of surveys developed in class, plus the delivery of the practical report.

Specifications for the resit/retake exam:

The extraordinary evaluation of the course will consider: the value obtained in the final exam (this exam will consist of a series of exercises whose subject matter will try to cover most of the aspects of the course, establishing the evaluation scales in each question), the work and practices developed throughout the course.

Specifications for the second resit / retake exam:

The evaluation of the special call for the end of the course will consider: the value obtained in the final test (this test 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), the work and practices elaborated throughout the course.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Individual tutoring sessions [PRESENCIAL][Guided or supervised work]	6.5
Final test [PRESENCIAL][Assessment tests]	6.25
Unit 1 (de 11): Introduction. General information	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Unit 2 (de 11): Percussion Drilling	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Unit 3 (de 11): Rotopercussive drilling	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Unit 4 (de 11): Rotational drilling	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	6
Unit 5 (de 11): Rotation drilling with core recovery	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Unit 6 (de 11): Directional drilling	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Unit 7 (de 11): Safety and environment in drilling	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1.75
Unit 8 (de 11): Applications for groundwater abstraction	
Activities	Hours
Class Attendance (practical) [PRESENCIAL][Combination of methods]	3
Other on-site activities [PRESENCIAL][Case Studies]	4
Unit 9 (de 11): Applications for geological-mining research	
Activities	Hours
Class Attendance (practical) [PRESENCIAL][Combination of methods]	4
Other on-site activities [PRESENCIAL][Case Studies]	4.5
Unit 10 (de 11): Applications for hydrocarbon research	
Activities	Hours
Class Attendance (practical) [PRESENCIAL][Combination of methods]	4
Other on-site activities [PRESENCIAL][Case Studies]	5.5
Unit 11 (de 11): Civil engineering applications	
Activities	Hours
Class Attendance (practical) [PRESENCIAL][Combination of methods]	1.5
Other on-site activities [PRESENCIAL][Case Studies]	1
Global activity	
Activities	hours
Class Attendance (practical) [PRESENCIAL][Combination of methods]	12.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Other on-site activities [PRESENCIAL][Case Studies]	15
Class Attendance (theory) [PRESENCIAL][Lectures]	19.75
Final test [PRESENCIAL][Assessment tests]	6.25
Individual tutoring sessions [PRESENCIAL][Guided or supervised work]	6.5
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Pimienta, J.	La captación de las aguas subterráneas	Editores técnicos asociados			1973	
Puy Huarte, J.	Procedimientos de sondeos	Servicio de Publicaciones de JEN			1984	
Plote, H.	Sondage de reconnaissance hidrogeologique. Methode du marteau fond-de-trou	BRGM			1985	
Hartley, J.J.	Drilling tools and programme	A.A.Bakaman			1987	

Astier, B. et al.	Realisation des forages dirigés et controle des trajectoires	Technip	1985
Cambefort, H.	Perforaciones y Sondeos		1980
Mansilla Plaz Luis et. al	Proyecto tipo para la ejecución de un sondeo para captación de aguas subterráneas (2ª edición	Arcedlande	2015
Nguyent, J.P.	Le Foreur	Technip	1993
García, Elvira	Manual de Perforación Dirigida Horizontal	U:D: Proyectos de la ETSIM de Madrid	2002
Lopez Jimeno, C. et al.	Manual de Sondeos	U:D: Proyectos de la ETSIM de Madrid	2000
:F:P	Formulaire de Foreur/ Drilling data Handbook	Technip	2000