

## SUBJECT TEACHING GUIDE

### G600 - Explosives Technology

### Degree in Energy Resources Engineering

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Energy Resources Engineering			Type and Year	Compulsory. Year 4
Faculty	School of Mines and Energy Engineering				
Discipline	Subject Area: Technology of Mineral and Energy Resources Module: Training in Energy Resources, Fuels and Explosives				
Course unit title and code	G600 - Explosives Technology				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. TRANSPORTES Y TECNOLOGIA DE PROYECTOS Y PROCESOS				
Name of lecturer	RUBEN PEREZ ALVAREZ				
E-mail	ruben.perez@unican.es				
Office	E.P. de Ingeniería de Minas y Energía. Planta: + 2. DESPACHO (228)				
Other lecturers	JAVIER SEDANO CIBRIAN				

### 3.1 LEARNING OUTCOMES

- Had the subject been passed, the student will have specific knowledge about explosives and pyrotechnic elements, their physical and chemical properties, manufacturing, transport, Law and safety aspects.

### 4. OBJECTIVES

The main objective of this subject is the analysis of the main characteristics of industrial explosives and pyrotechnical elements, their production, selection, supply and use. Legal and safety aspects are also considered.

**6. COURSE ORGANIZATION**

**CONTENTS**

1	<p>TYPES OF EXPLOSIVES AND THEIR FEATURES.</p> <p>1.1. Features of explosives.</p> <p>1.2. Industrial explosives.</p> <p>1.2.1.- History of explosives.</p> <p>1.2.2.- Main types of explosives.</p> <p>1.2.1.- Manufacture of explosives and pyrotechnics.</p> <p>1.3.- Criteria of selection of an explosive.</p>
2	<p>FIRING SYSTEMS.</p> <p>Electric blasting.</p> <p>Non-electric blasting.</p> <p>Electronic blasting.</p>
3	<p>ROCK BREAKAGE AND BLAST CALCULATIONS</p> <p>Bench blasting.</p> <p>Contour blasting.</p> <p>Underground blasting.</p> <p>Other types.</p>
4	<p>UNDESIRE EFFECTS OF BLASTING.</p> <p>Projections.</p> <p>Vibrations and aerial waves.</p>
5	<p>LEGAL ASPECTS.</p> <p>Legal framework about use and handling.</p> <p>Storage and transport.</p> <p>Destruction of Explosives.</p> <p>Destruction of explosives.</p>

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Written exam	Written exam	Yes	Yes	60,00
Tests	Written exam	No	Yes	10,00
Resolution of Practical Cases	Written exam	No	Yes	20,00
Teamwork Essay	Work	No	Yes	10,00
TOTAL				100,00
Observations				
<p>The final exam will be divided in theory and practice (50% of the total score for each part). The student must obtain a minimal score of 4.5/10 on each. If these requirements are not satisfied, the final score will be obtained as the weighted average of the different items of evaluation, until a maximum of 4.9. Any passed item would be kept for the extraordinary evaluation.</p> <p>The tests, practical exercises, and the final exam will be held on-site. However, if Sanitary and Educational Authorities suspended in-class activities, they would be held through Moodle, and monitored with Teams.</p>				
Observations for part-time students				
<p>Part-time students will be evaluated following the considerations established in the Normative of the University of Cantabria. They will be given the chance to develop the teamwork essay as an individual one (10%), and to take a test (10% of the final score) and an exercise (20% of the final score) on the same date of the final exam, or on a date to be agreed between the student and the Professor, according to their availability.</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
<p>Curso de Tecnología de Explosivos. Autores: J.A. Sanchidrián, E. Muñiz. Fundación Gómez Pardo, D.L. 2000.</p> <p>Manual de empleo de explosivos. U.E.E., 2000.</p> <p>Apuntes proporcionados por los profesores.</p>