

SUBJECT TEACHING GUIDE

G629 - Environmental Technology in Mining

Degree in Mining Resources Engineering

Academic year 2016-2017

1. IDENTIFYING DATA					
Degree	Degree in Mining Resources Engineering			Type and Year	Compulsory. Year 4
Faculty					
Discipline	Subject Area: Mining Pre-Technology Module: Training in Common with the Mining Branch				
Course unit title and code	G629 - Environmental Technology in Mining				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	English	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. CIENCIAS Y TECNICAS DEL AGUA Y DEL MEDIO AMBIENTE				
Name of lecturer	CARLOS RICO DE LA HERA				
E-mail	carlos.rico@unican.es				
Office	E.T.S. Ingenieros de Caminos, C.P.. Planta: + 2. DESPACHO (2032)				
Other lecturers	ANA LORENA ESTEBAN GARCIA RUBEN DIEZ MONTERO				

3.1 LEARNING OUTCOMES
- Ability to interpret a basic analysis of water .
- Capacity to design simple water treatment processes
- Ability to identify or characterize a waste or a contaminated soil
- Simple design capacity of simple waste treatment systems or recovery of contaminated soils
- Ability to identify environmental management tools and to interpret environmental indicators.
- Ability to identify the need to perform an Environmental Impact Assessment and to apply simple methods to study the Environmental Impact
- Capacity to control the atmosphere of the mine

4. OBJECTIVES

Knowing the basics of Environmental Engineering

Interpret basic water quality analysis

Basic design of water treatment processes by origin and specific objectives

Classify wastes according to its properties and characteristics

Categorize soils according to its pollution content

Design basic treatment systems for wastes and polluted soils

Knowing the environmental management tools and their applicability.

Knowing the applicability of the Environmental Impact Assessment and methods to study the Environmental Impact in the mining framework.

6. COURSE ORGANIZATION

CONTENTS

1	Introduction to environmental technology. Environmental management. Public health. Environmental toxicology. Environmental engineering. Air pollution. Water quality. Impurities and water contaminants. Characterization of the water
2	Mine atmosphere. The air in the mine. Firedamp. Firedamp explosions. Dust at mine sites.
3	Ventilation Theory. Data collection, circuits and basic formulas. Mechanical ventilation equipment. Ventilation facilities. Secondary ventilation.
4	Water pollution. Water and wastewater treatment. Impact of mining in water quality, sources and management of wastewater in mining, wastewater treatment plants. Pretreatment: bar racks, screening, grit and grease removal, equalization. Primary treatment: primary settling tanks, dissolved air flotation, coagulation-flocculation. Secondary treatment: biological process. Other treatments: softening, neutralization, heavy metals removal.
5	Solid waste management Introduction to solid waste: concepts and types, characteristics of solid wastes, generation of municipal solid waste, municipal solid waste management. Types of solid wastes and materials in mining: overburden, waste rock, tailing, spent ore/heap and dump leach residues. Waste rock and overburden management: piles and dumps, mine backfill, use in facility construction, use as cover material. Tailings management: tailings impoundments, dry tailings facilities, subaqueous tailings disposal. Spent ore/heap and dump leach management.
6	Environmental Impact and Restoration Techniques. Mining and the environment. Legislation. Type of mining. Waste dumps and dam wastes. Control of abandoned workings. Erosion control and sedimentation. Landscape integration. Use of the land affected by mining activities. Restoration of vegetation and selection of plant species and methods for their implantation. Economic evaluation of restoration projects. Identification of alterations and environmental impact assessment. Soil pollution. The importance of soil. The concern about soil degradation. Soil pollution. Legislation. Polluted soils management. Polluted soils remediation.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Description Reports of field visits	Work	No	No	10,00
Description Coursework	Work	No	No	15,00
Description Lab practices	Laboratory evaluation	No	No	15,00
Description Exam	Written exam	Yes	Yes	60,00
TOTAL				100,00
Observations				
The exam will have theoretical and problem parts.				
Observations for part-time students				
According to regulations of the University				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

- Introduction to Environmental Engineering (Fifth Edition). Mackenzie L. Davis, David A. Cornwell. McGraw-Hill, 2013.
- Wastewater Engineering: Treatment and Reuse (Fourth Edition). George Tchobanoglous, Franklin L. Burton, H. David Stensel. McGraw-Hill, 2003.
- Industrial Water Pollution Control (Second Edition). W. Wesley Eckenfelder. McGraw-Hill, 1989.
- Integrated Solid Waste Management: Engineering Principles and Management Issues. George Tchobanoglous, Hilary Theisen, Samuel Vigil. McGraw-Hill, 1993.