

SUBJECT TEACHING GUIDE

G638 - Metallurgy and the Iron and Steel Industry

Degree in Mining Resources Engineering

Academic year 2021-2022

1. IDENTIFYING DATA					
Degree	Degree in Mining Resources Engineering			Type and Year	Compulsory. Year 4
Faculty					
Discipline	Subject Area: Minerallurgical Technology Module: Training in Exploitation of Mines				
Course unit title and code	G638 - Metallurgy and the Iron and Steel Industry				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. CIENCIA E INGENIERIA DEL TERRENO Y DE LOS MATERIALES				
Name of lecturer	LUCIANO SANCHEZ ARAMBURU				
E-mail	luciano.sanchez@unican.es				
Office	E.P. de Ingeniería de Minas y Energía. Planta: + 1. DESPACHO 4 - I. AMBIENTAL (143)				
Other lecturers					

3.1 LEARNING OUTCOMES
- To calculate mass and energy balances applied to metallurgical and iron and steel industrial processes.
- To have a good command of the order of iron and steel industry real operations and their operational parameters.
- To value the economic implications of the metallurgical and iron and steel industrial sector.
- To know the implications and possibilities of the use of secondary raw materials within the context of sustainability.

4. OBJECTIVES

To approach students to the real industrial problem of obtaining proper quality products at a competitive price.

To inform students about the metallurgical problems related to the treatment of ores so students will know the difference between theoretical and real processes.

To understand the importance of secondary metallurgy which provides with minor metals necessary for new technologies and avoids the processes of primary resources manufacture.

To support the physical-chemical foundations of basic metallurgical and iron and steel processes, applying them to the study of specific cases.

6. COURSE ORGANIZATION

CONTENTS

1	<p>DEFINITION AND CLASIFICATION OF METALLURGY</p> <p>1.1 History of Metallurgy</p> <p>1.2 Subject Objectives</p> <p>1.3 Study of Metals</p> <p>1.4 Earth Crust Composition</p> <p>1.5 Row Materials and Metallurgical Products: ores, chemical reagents, useful products, intermediate products.</p>
2	<p>METALLURGICAL PROCESS</p> <p>2.1 Calcination without Chemical Decomposition</p> <p>2.2 Roasting</p> <p>2.3 Smelting</p> <p>2.4 Volatilization</p> <p>2.5 Hydrometallurgy</p>
3	<p>METALLURGY OF NON-FERROUS METALS</p> <p>3.1 Copper. Economic Factors. Copper Metallurgy: Pyrometallurgy (Roasting, Smelting, Converting, Refining). Hydrometallurgy (leaching, Bacterial Leaching, Organic Solvent Extraction, Electrolytic Precipitation)</p> <p>3.2 Aluminium. Economic Factors. Aluminium Metallurgy: The Bayer Process. Process for Obtaining Aluminium.</p> <p>3.3 Zinc. Economic Factors. Zinc Metallurgy: Pyrometallurgy (Roasting, Reduction, Refining). Hydrometallurgy (leaching, Fe Precipitation, Electrolyte purification, Electrolysis)</p> <p>3.4 Metallurgy of other non-ferrous metals.</p>
4	<p>IRON AND STEEL INDUSTRY</p> <p>4.1 Raw Materials</p> <p>4.2 Steel Production</p> <p>4.3 Casting of Steel</p> <p>4.4 Hot Rolling</p> <p>4.5 Tubular Products</p> <p>4.6 Forging</p> <p>4.7 Cast Steel</p> <p>4.8 Environment in Iron and Steel Industry</p> <p>4.9 Testing of Steels</p> <p>4.10 Steel Applications</p>

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Final exam	Written exam	Yes	Yes	60,00
Laboratory works and class attendance	Laboratory evaluation	No	No	15,00
Company visits and reports presentation	Work	No	Yes	5,00
Random tests	Written exam	No	Yes	10,00
Directed works	Work	No	Yes	10,00
TOTAL				100,00
Observations				
It is necessary to obtain at least a score of 2.4 over 6 in the final exam.				
Observations for part-time students				
It can adapt the assessment method for part time students.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

- Metalurgia. Metalurgia extractiva no ferrosa.
Charles Burroughs Gill.
Editorial Limusa 1.989
- Metalurgia extractiva (tomos I y II).
José Sancho, Luis Felipe Verdeja y Antonio Ballester
Editorial Síntesis 2.000
- La fabricación del acero
UNESID (Unión de Empresas Siderurgicas) 1.998
- Metalurgia general
Abelardo Rovira Pereira Editorial Dossat