



IDENTIFYING DATA

Installations and Procedures for Collection of Metallic Materials

Subject	Installations and Procedures for Collection of Metallic Materials			
Code	V09G310V01523			
Study programme	(*)Grao en Enxeñaría dos Recursos Mineiros e Enerxéticos			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	3rd	1st
Teaching language	Spanish			
Department				
Coordinator	Cabeza Simo, Marta María			
Lecturers	Cabeza Simo, Marta María			
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General description	The course is delivered in two parallel parts; one part covering case studies on the extractive metallurgy of iron/steel, copper, aluminum, lead and zinc, and a second part covering metallurgical theory and principles. Throughout the course there is an emphasis on pyrometallurgical processing, but also hydrometallurgical aspects will be covered. Knowledge and skills for the use of commercial metallurgical chemical thermodynamic databases HSC Chemistry for Metallurgy.			

Competencies

Code	
A37	(*)CEMM2 Metalurxia e tratamento de concentrados minerais, metais e aliaxes: industria metalúrxica férrea e non férrea, aliaxes especiais, ensaios metalotécnicos, etc.
A38	(*)CEMM3 Composición, estruturas, propiedade e aplicacións dos materiais xeolóxicos metalúrxicos.
B1	(*)CG1 Capacidade de interrelacionar todos os coñecementos adquiridos, interpretándoos como compoñentes dun corpo do saber cunha estrutura clara e unha forte coherencia interna.
B2	(*)CG2 Capacidade de desenvolver un proxecto completo en calquera campo desta enxeñaría, combinando de forma adecuada os coñecementos adquiridos, accedendo ás fontes de información necesarias, realizando as consultas precisas e integrándose en equipos de traballo interdisciplinar.
B3	(*)CG3 Propoñer e desenvolver solucións prácticas, utilizando os coñecementos teóricos, a fenómenos e situacións-problema da realidade cotiá propios da enxeñaría, desenvolvendo as estratexias adecuadas.
B4	(*)CG4 Favorecer o traballo cooperativo, as capacidades de comunicación, organización, planificación e aceptación de responsabilidades nun ambiente de traballo multilingüe e multidisciplinar, que favoreza a educación para a igualdade, para a paz e para o respecto dos dereitos fundamentais.
B5	(*)CG5 Coñecer as fontes necesarias para dispoñer dunha actualización permanente e continua de toda a información precisa para desenvolver o seu labor, accedendo a todas as ferramentas, actuais e futuras, de busca de información e adaptándose aos cambios tecnolóxicos e sociais.
B6	(*)CG6 Coñecer e manexar a lexislación aplicable ao sector, coñecer o medio social e empresarial e saber relacionarse coa administración competente integrando este coñecemento na elaboración de proxectos de enxeñaría e no desenvolvemento de calquera dos aspectos do seu labor profesional.
B7	(*)CG7 Capacidade para organizar, interpretar, assimilar, elaborar e xestionar toda a información necesaria para desenvolver o seu labor, manexando as ferramentas informáticas, matemáticas, físicas, etc. necesarias para iso.
B8	(*)CG8 Concibir a enxeñaría nun marco de desenvolvemento sostible con sensibilidade cara temas ambientais.
B9	(*)CG9 Entender a transcendencia dos aspectos relacionados coa seguridade e saber transmitirle esta sensibilidade ás persoas do seu ámbito.
B10	(*)CG10 Tomar conciencia da necesidade dunha formación e mellora continua de calidade, desenvolvendo valores propios da dinámica do pensamento científico, mostrando unha actitude flexible, aberta e ética ante opinións ou situacións diversas, en particular en materia de non discriminación por sexo, raza ou relixión, respecto aos dereitos fundamentais, accesibilidade, etc.

Learning aims		
Expected results from this subject	Training and Learning Results	
(*)	A37	
(*)	A38	
(*)		B1
(*)		B2
(*)		B3
(*)		B4
(*)		B5
(*)		B6
(*)		B6
(*)		B7
(*)		B8
(*)		B9
(*)		B10

Contents

Topic	
The Extraction of the Metals.	Generalities and historical evolution: metallurgical Processes. Ores and Metals
Previous operations.	Basic operations of concentration. Calcination. Roasting Agglomeration of raw materials
Pirometallurgy	Physical bases-chemical of the operations of fusion. Fusion of oxides and sulphides. Slags, refractory and Ovens. Pirometallurgical refining Steelmaking Copper Metallurgy
Hidrometallurgy	Physical and chemical principles of the hidrometallurgical processes Stages of the hidrometallurgical process Leaching technology Purificación and concentration of the garge licour Recovery of the metal Application of the hidrometallurgy to the metal extraction: Obtaining of gold, uranium, copper, zinc. Bayer Process
Electrometallurgy	Physical and chemical principles, and parameters. Electrolytic recovery. electrolytic refine Hall- Heroult Process
Environmental impact, evaluation and correction.	Pirometallurgy (Concentration of gases in smokes) Hidrometallurgy Standarts

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	0.5	0	0.5
Master Session	21.5	4.5	26
Laboratory practises	3	0	3
Troubleshooting and / or exercises	12	12	24
Autonomous troubleshooting and / or exercises	0	15	15
Practice in computer rooms	2	0	2
Integrated methodologies	0	15	15
Presentations / exhibitions	2	0	2
Seminars	8	12	20
Reports / memories of practice	0	1	1
Short answer tests	2	20	22
Self-assessment tests	0	2	2
Troubleshooting and / or exercises	1.5	15	16.5

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
	Description
Introductory activities	It includes here the introduction to the subject, program, methodologies employed to reach the aims fixed and the evaluation way Bibliography
Master Session	Exhibition by part of the professor of the complexes contentof the subject, as well as the theoretical bases and guidelines of work. It will be participatory classes. Peer Instruction.
Laboratory practises	To level of laboratory will analyse some of the chemical bases of the metallurgical processes.
Troubleshooting and / or exercises	Exercies and problems in class. They will be solve by the students with help of the professor.
Autonomous troubleshooting and / or exercises	The student will solve at home some exercices.
Practice in computer rooms	Use of a compute program. The program have some examples of metallurgy thermodynamic. They will have to solve some cases in the computer laboratory
Integrated methodologies	Here they will do groups LBP (learning based in projects). They will have to do a web page to describe a recovery metal process .
Presentations / exhibitions	Exhibition of the works realised in PBA. Evaluation between groups
Seminars	Classes in which each one of them will devote to a specific subject of greater complexity. It will employ documentation and will try that the class was dynamic. Cooperative learning

Personalized attention

Methodologies	Description
Master Session	The proffesor will help the student by the network or in schedule of tution to solve some problem in the methodologies employed.
Autonomous troubleshooting and / or exercises	The proffesor will help the student by the network or in schedule of tution to solve some problem in the methodologies employed.
Integrated methodologies	The proffesor will help the student by the network or in schedule of tution to solve some problem in the methodologies employed.
Presentations / exhibitions	The proffesor will help the student by the network or in schedule of tution to solve some problem in the methodologies employed.

Assessment

	Description	Qualification
Autonomous troubleshooting and / or exercises	They will have to do some exercices during the course as homework.	5
Practice in computer rooms	In the examination will do a small simple question of the computer program.	5
Integrated methodologies	Assessment by the professor 5% Assessment by the others groups 5% Assessment of each student to the members of his group 5%	15
Reports / memories of practice	Individual report of the practices at the laboratory	5
Short answer tests	Two proofs along the course to check the knowledge of the subject. (10% each). They will not be eliminatory. At the end it will do a final proof that will complete the percentage	40
Self-assessment tests	It is necessary to realise 100% of the proofs in order to follow the continuous evaluation.	5
Troubleshooting and / or exercises	It is a proof with different exercices.	25

Other comments on the Evaluation

To continuous assessment must deliver 90% of the proposed activities.
Continuous assessment is not saved for the second call which consists of a theory exam and exercices.
The dates can be found on the website of the ETSEM of Vigo

Sources of information

Ballester,A., Verdeja, L.F. , Sancho, J.,, **Metalurgia Extractiva Volumen 1 - Fundamentos.**, 1,
Rosenqvist, T.,, **Fundamentos de Metalurgia Extractiva**, Limusa,
UNESID (Unión de Empresas Siderúrgicas)., **La fabricación del Acero**.,

Recommendations

Subjects that are recommended to be taken simultaneously

Degradation and Recycling of Materials/V09G310V01624

Forming Treatment and Materials/V09G310V01522

Subjects that it is recommended to have taken before

Physics: Physics I/V09G310V01102

Chemistry/V09G310V01105

Physics: Thermal Systems/V09G310V01302

Safety and Health/V09G310V01403

Mineralurgy/V09G310V01521
