



IDENTIFYING DATA

Ore concentration

Subject	Ore concentration			
Code	V09G310V01511			
Study programme	(*)Grao en Enxeñaría dos Recursos Mineiros e Enerxéticos			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	3rd	1st
Teaching language	Spanish Galician			
Department				
Coordinator	Giraldez Pérez, Eduardo			
Lecturers	Feijoo Conde, Jorge Giraldez Pérez, Eduardo Taboada Castro, Javier			
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General description	In this subject the student will purchase the necessary knowledges to pose processes of mineral resources use in the treatment of subjects extracted in mining deposits			

Competencies

Code	
B1	(*)Capacitación científico-técnica para o exercicio da profesión de Enxeñeiro Técnico de Minas e coñecemento das funcións consultivas, análise, deseño, cálculo, proxecto, construción, mantemento, conservación e explotación.
B2	(*)Comprender os múltiples condicionamentos de carácter técnico e legal que xorden no desenvolvemento, no ámbito da enxeñaría de minas, que teñan por obxecto, de acordo cos coñecementos adquiridos segundo o previsto no parágrafo 5 da orde CIN7306 / 2009, a prospección e investigación xeolóxica-mineira, as explotacións de todo tipo de recursos xeolóxicos, incluíndo as augas subterráneas, as obras subterráneas, os almacenamentos subterráneos, as plantas de tratamento e beneficio, as plantas de enerxía, as plantas mineralúrxicas e siderúrxicas, as plantas de materiais para a construción, as plantas de carboquímica, petroquímica e gas, as plantas de tratamentos de residuos e efluentes e fábricas de explosivos e capacidade para empregar métodos contrastados e tecnoloxías acreditadas, co obxectivo de acadar unha maior eficacia dentro do respecto polo Medio Ambiente e a protección da seguridade e saúde dos traballadores e usuarios das mesmas.
B3	(*)Capacidade para deseñar, redactar e planificar proxectos parciais ou específicos das unidades definidas no parágrafo anterior, tales como instalacións mecánicas e eléctricas e o seu mantemento, redes de transmisión de enerxía, instalacións transporte e almacenamento para materiais sólidos, líquidos ou gasosos, entullarías, balsas ou encoros, sostemento e cimentación, demolición, restauración, voaduras e loxística de explosivos.
B4	(*)Capacidade para deseñar, planificar, operar, inspeccionar, asinar e dirixir proxectos, plantas ou instalacións, no seu ámbito.
B5	(*)Capacidade de realización de estudos de ordenación do territorio e dos aspectos medioambientais relacionados cos proxectos, plantas e instalacións, no seu ámbito.
B6	(*)Capacidade para o mantemento, conservación e explotación dos proxectos, plantas e instalacións, no seu ámbito.
B7	(*)Coñecemento para realizar, no ámbito da enxeñaría de minas, de acordo cos coñecementos adquiridos segundo o disposto no apartado 5 da orde CIN /306/2009, medicións, replanteos, planos e mapas, cálculos, valoracións, análise riscos, peritaxes, estudos e informes, plans de traballo, estudos de impacto ambiental e social, plans de restauración, sistema control de calidade, sistema de prevención, análise e avaliación das propiedades dos materiais metálicos, cerámicos, refractarios, sintéticos e outros materiais, caracterización de solos e macizos rochosos e outros traballos semellantes.
B8	(*)Coñecemento, comprensión e capacidade de aplicar a lexislación necesaria no exercicio da profesión de Enxeñeiro Técnico de Minas.
C34	
C35	
D1	
D2	

D3
D4
D5
D6
D7
D8
D10

Learning outcomes

Expected results from this subject	Training and Learning Results		
Know the experimental process used in the *prantas of *tratamiento of minerals and concentration of *menas, *profundizando in the aspects key of the concentration of *menas	B1	C34	D1
	B2	C35	D2
	B3		D5
	B4		D6
	B6		D7
	B7		D8
	B8		D10
	Dominate the different available techniques stop the concentration of *menas, knowing the aspects key stop the selection, design and calculation of the different systems of existing concentration. Design, operation and maintenance of *prantas of preparation and treatment of minerals, industrial rocks, rocks *ornamentais and waste.	B1	C34
B2		C35	D2
B3			D3
B4			D4
B5			D5
B6			D6
B7			D7
B8			D8
			D10

(*) -A2 Conocer las técnicas dirigidas a la averiguación y establecimiento de los hechos en los distintos tipos de procedimiento, especialmente la producción de documentos, los interrogatorios y las pruebas periciales.

(*) -A2 Conocer las técnicas dirigidas a la averiguación y establecimiento de los hechos en los distintos tipos de procedimiento, especialmente la producción de documentos, los interrogatorios y las pruebas periciales.

Purchase skills envelope the process of analysis of concentration *gravimétrica, *profundizando in the design and calculation of *circuitos of *frotación. Propose and develop practical solutions of design of *circuitos of *frotación, using the theoretical knowledges, to treat and benefit mineral resources, developing the suitable strategies it such end.	B1	C34	D1
	B2	C35	D2
	B3		D3
	B4		D4
	B5		D5
	B6		D6
	B8		D7
			D10

Contents

Topic	
DIDACTIC UNIT 1. Crushing systems. Introduction to the mineral processing and his technology	- Mineral substances, metallic minerals and no metallic - Methods of mineral processing - Costs of the mineral processing - Diagrams of flow - Efficiency of the operations of mineral processing: liberation (fragmentation) and concentration (enrichment). - Introduction to the technologies of liberation and enrichment: reduction of the size, ranking, concentration, flotation, magnetic separation and electrostatic energy.
DIDACTIC UNIT 2. Mill systems. Reduction of size.	- Fragmentation of the solid and his aim - Theory of wool fragmentation - Energetic law - Types of fragmentation and stages - Fragmentation by compression: crusher of jaws, rotation crusher and cones. - Fragmentation by percussion: mills of hammers and mixed - Fragmentation by mixed processes: bars, balls and autogenous - practical Cases of circuits of calculation of balance of masses in circuits with *machacadoras and mills.

DIDACTIC UNIT 3. Size classification. Control of Size and Ranking	<ul style="list-style-type: none"> - Direct ranking: screening. Factors, performance and efficacy and teams of screening. - Indirect ranking: bases, types of settlement, types of sorting , efficacy and performance. - Practical cases of calculation of balance of masses of circuits with sorters in dry, in wet conditions and working with pulpe.
DIDACTIC UNIT 4. Ore concentration. Gravimetric concentration	<ol style="list-style-type: none"> 1. Gravimetric concentration in water. <ul style="list-style-type: none"> - Pushbutton JIG - Tables of shakes - Spiral Humphreys - Channels of tips - Cones Reichert - Concentrators of centrifugators - Concentrator Mozley 2. Gravimetric concentration in dense means (DMS) <ul style="list-style-type: none"> - Principles - Liquids of separation - Separation equipments of gravity - Separation equipments of centrifugation
DIDACTIC UNIT 5. Magnetic separation.	<ul style="list-style-type: none"> - Principles - Teams of separation - Purification - Concentration - Wet way - dry Road
DIDACTIC UNIT 6. Electrostatic separation	<ul style="list-style-type: none"> - Principles - Teams of separation - High tension electrodynamic equipments - Electrostatic equipments - Type rotor - Type plate - Of plate - Of mesh
DIDACTIC UNIT 7: Flotation	<ul style="list-style-type: none"> - Principles - Types - Reactives for flotation - Teams - Variable in wool flotation - Selective flotation
DIDACTIC UNIT 8: Heavy flow separation. Pneumatic separation. Introduction to joined processes: mineral-metalurgic process	<ul style="list-style-type: none"> - Principles - Types - Influence of mineral process in wool of main metalurgic minerals.

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practises	6	10	16
Outdoor study / field practises	10	5	15
Integrated methodologies	2	20	22
Troubleshooting and / or exercises	10	22	32
Master Session	19	28	47
Short answer tests	2	15	17
Systematic observation	1	0	1

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

Methodologies

	Description
Laboratory practises	Activities of application of the knowledges to concrete situations and of acquisition of basic skills and *procedimentales related with the subject object of study. They develop in special spaces with specialized equipment (scientific laboratories-technical).
Outdoor study / field practises	Activities of application of the knowledges to concrete situations and of acquisition of basic skills and procedimentales related with the subject object of study. They develop in spaces no academic outsides (companies of the sector).
Integrated methodologies	Teaching based in projects of learning: Method in the that the students carry out the realization of one project in a time determined to resolve a problem or technical formulation which offers a previous information and guidelines to be resolved.

Troubleshooting and / or exercises	Activity in the that formulate problem and/or exercises related with the subject. The student owes to develop the suitable or correct solutions by means of the application of routines, formulas or algorithms and the interpretation of the resulted. It uses how supplement of the lecture
Master Session	Exhibition by part of the professor of the contained envelope to subject object of study, theoretical bases and/or guidelines of one work, exercise or project to develop pole student

Personalized attention

Methodologies Description

Master Session	It Will offer attention customized to the student during all the course stop the resolution of doubts envelope the theoretical kinds and the problems and envelope to manufacture of the project exposed. The tutorial class will be able to offered during the sessions presential lessons, in the office of the professor (M119), by email (egiraldez@uvigo.es) and by means of the platform of teaching support (Faitic)
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Assessment

	Description	Qualification	Training and Learning Results
Laboratory practises	#Take in the evaluation of the subject to assistance to the practices of laboratory, the delivery of a bulletin of the experience and the correction of the even. The note of this methodology will be how maximum of 1 point on 10. The results of learning assessed will be: know the experimental process used in the mineral process plants and concentration of ore, going into detail about the aspects key of the concentration of ore	10	B1 C34 D1 B2 C35 D2 B3 D5 B4 D6 B6 D7 B7 D8 B8 D10
Integrated methodologies	The student will owe to deliver the result of the project proposed and exposed publicly. It Will evaluate the rigour and the correction of the work writing and the capacity of synthesis in the oral presentation. The work will mark how maximum 2 points envelope the 10 of the global note. The results of learning evaluated will be: be fluent in the different available techniques stop the concentration of ore, knowing the aspects key stop the selection, design and calculation of the different systems of existing concentration; Design, operation and maintenance of plants of preparation and treatment of minerals, industrial rocks, ornamental rocks and waste.	20	B1 C34 D1 B2 C35 D2 B3 D3 B4 D4 B5 D5 B6 D6 B7 D7 B8 D8 D10
Troubleshooting and / or exercises	Along the course, the student will owe to resolve several bulletins of problems, that work previously in the classroom, will owe to presented and will be assement as a maximum of 1 point envelope the 10 of the global note. The result of learning assessed will be: dominate different wools available techniques stop the concentration of ore, knowing the aspects key stop the selection, design and calculation of the different systems of existing concentratio.; Design, operation and maintenance of plants of preparation and treatment of minerals, industrial rocks, ornamental rocks and waste.	10	B1 C34 D1 B2 C35 D2 B3 D3 B4 D4 B5 D5 B6 D6 B7 D7 B8 D8 D10
Short answer tests	The proof written will consist in the resolution of questions of short answer and of varied problems. The punctuation of this exam envelope to global note and of a maximum of 5 envelope to global note of 10; so that the note of the exam can explain in the global assessment, will owe to surpass the 2.5 on 5. The results of the learning evaluated will be; dominate the different available techniques stop the concentration of ore, knowing the aspects key stop the selection, design and calculation of the different systems of existing concentration; Design, operation and maintenance of preparation plants and treatment of minerals, industrial rocks, ornamental rocks and waste; purchase skills envelope the process of analysis of concentration gravimetric, be fluent in the design and calculation of flotation systems; Propose and develop practical solutions of design of flotation systems, using the theoretical knowledges, to treat and benefit mineral resources, developing the suitable strategies it such end	50	B1 C34 D1 B2 C35 D2 B3 D3 B4 D4 B5 D5 B6 D6 B7 D7 B8 D8 D10

Systematic observation	The assistance to kind and the resolution of proofs type test of continuous autoassessment during it study (subjects it a calendar) will mark with a weight of 1 point envelope the 10 of the global note. The results of learning evaluated will be: know the experimental process used in the mineral process plants and concentration of ore, be fluent in the aspects key of the concentration of ore;dominate the different available techniques stop the concentration of ore, knowing the aspects key stop the selection, design and calculation of the different systems of existing concentration; design, operation and maintenance of preparationplants and treatment of minerals, industrial rocks, ornamental rocks and waste; purchase skills envelope the process of analysis of concentration gravimetric, be fluent in the design and calculation of flotation systems; propose and develop practical solutions of design of flotation systems, using the theoretical knowledges, to treat and benefit mineral resources, developing the suitable strategies it such end.	10	B1 C34 D1 B2 C35 D2 B3 D3 B4 D4 B5 D5 B6 D6 B7 D7 B8 D8 D10
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Other comments on the Evaluation

The evaluation features of *duas parts:1) Examination: the punctuation of this examination envelope to global note is of a maximum of 5 on 10. So that the note of the *examen can explain in the global evaluation, will owe to be the same the @superior to 2.5 on 5.2) Practical of laboratory, methodologies integrated, resolution of problems and exercises and systematic observation: these *cuatro methodologies mark in *conjunto 5 points envelope to global note 10. So that the note of this group of methodologies compute in the final note, will owe to obtain the *lo less a 2.5 on 5 stop the group of methodologies. The dates of the examinations, will be the approved in Together of School.This information can verified/consulted of form updated in the page web of the centre:

#http://webs.uvigo.es/*etseminas/*cms/*index.*php?*id=181,0,0,1,0,0

Sources of information

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BLAZY, P. (1977) El beneficio de los minerales. Editorial Rocas y Minerales.Madrid

FUEYO, L.(1999) Equipos de trituración, molienda y clasificación .Editorial Rocas y Minerales. Madrid.

KELLY, E. G., SPOTTISWOOD, D.J.(1990) Int. al procesamiento de minerales. Editorial Limusa. México

MULAR, A.L.,BHAPPU,R.B. (1982) Diseño de plantas de proceso de minerales.2 tomos. Editorial Rocas y Minerales. Madrid

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Recommendations