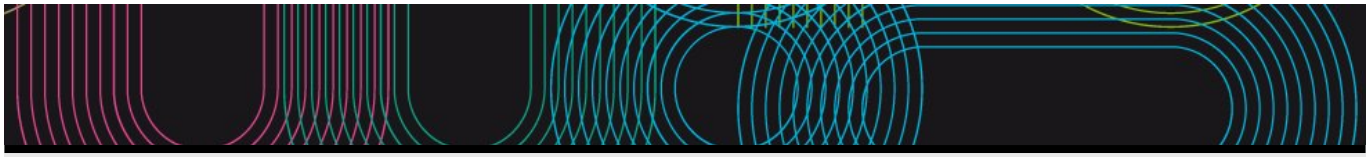

IDENTIFYING DATA				
GIS and land management				
Subject	GIS and land management			
Code	V09G311V01401			
Study programme	Grado en Ingeniería de los Recursos Mineros y Energéticos			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	4th	1st
Teaching language	Galician English			
Department				
Coordinator	Martínez Sánchez, Joaquín			
Lecturers	Martínez Sánchez, Joaquín Suárez Fernández, Gabriel Eduardo			
E-mail	joaquin.martinez@uvigo.es			
Web	http://minaseenerxia.uvigo.es/gl/			
General description	The geospatial data sector covers a wide variety of disciplines including GNSS and positioning, GIS or Earth Observation. The information that can be obtained from said data is key for multiple applications. This subject focuses on the characterization of previous technologies and their application to Territorial Planning. The objective is for students to achieve the ability to carry out studies in this field through skills related to photogrammetry, cartography and spatial analysis.			

Training and Learning Results	
Code	
A1	That the students demonstrate to possess and understand knowledge in an area of study that is part of the general education (second level), and often found at a level that, although based on advanced textbooks, also includes some aspects that involve knowledge from the avant-garde of the field of study
A2	That the students know how to apply their knowledge to their work or vocation in a professional way and that they possess the competences that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study
A3	That the students have the capability to gather and interpret relevant data (usually within their area of study) to issue judgments that include a reflection on relevant social, scientific or ethical issues
A4	That the students can transmit information, ideas, problems and solutions to a specialized and non-specialized audience
A5	That the students develop those learning capabilities necessary to undertake further studies with a high degree of autonomy.
B1	Scientific and technical training and qualification as a Mining Engineer and knowledge of the functions of consultancy, analysis, design, calculus, project, construction, maintenance, preservation and exploitation.
B2	To be familiar with the multiple technical and legal factors involved in the process of development, within the field of mining engineering, with the knowledge acquired in accordance with section 5 of order CIN/306/2009, pertaining to geological and mining prospecting and investigation, the explorations of all sorts of geological resources, including groundwater, underground construction, underground storage, treatment and benefit plants, energy plants, mineral processing and steel and iron plants, building materials plants, carbon chemistry, petrochemistry and gas plants, waste treatment and tributary plants, explosives factories, and ability to use well-tested methods and accredited technologies, with the aim of achieving the highest efficiency and ensuring the protection of the Environment and the safety and health of workers and users.
B5	Ability to do studies of land-use planning and of the environmental aspects involved in projects, plants and facilities, within their field.

B7	Ability to do, within the field of mining engineering, with the knowledge acquired in accordance with section 5 of order CIN/306/2009, measurements, stakeouts, planes and maps, calculations, assessments, risk analyses, expert reports and studies, work plans, environmental and social impact studies, restoration plans, quality control systems, prevention systems, analysis and assessment of the properties of metal, ceramic, refractory, synthetic and other materials, soil and rock mass classification and other works of a similar kind.
B8	To be familiar with and ability to apply the relevant legal framework to practice professionally as a Mining Engineer.
C14	Knowledge of topography, photogrammetry and cartography.
C27	To know, understand and apply the principles of Ecology and land planning. Land and urban planning and management.
C33	To know, understand and use the principles of thematic cartography.
D1	Ability to draw links between the different elements of all the knowledge they acquired, understanding them as components of a body of knowledge with a clear structure and strong internal cohesion.
D3	To suggest and develop practical solutions, using the relevant theoretical knowledge, to phenomena and problems-situations of ordinary reality that are specific to engineering, developing appropriate strategies.
D4	To foster collaborative working, communication, organization and planning skills, along with the ability to take responsibilities in a multilingual, multidisciplinary work environment that promotes education for equality, peace and respect for fundamental rights.
D5	To be familiar with the relevant sources of information, including constant updating, in order to practice one□s profession competently, accessing all the present and future tools of information search, constantly adapting to technological and social changes.
D7	Ability to organize, understand, assimilate, produce and handle all the relevant information to develop their professional work, using appropriate computing, mathematical, physics tools, etc. when these are required.
D11	Ability to understand the meaning and application of a gender perspective in the different spheres of knowledge and in people□s professional practice, with the ultimate aim of achieving a fairer, more equal society.
D12	Ability to communicate orally and in writing in Galician language.
D13	Commitment to environmental sustainability. Fair, responsible, efficient use of resources.

Expected results from this subject

Expected results from this subject	Training and Learning Results			
Comprise the necessary basic appearances for the preparation of maps to different scales.	A1 A5	B1 B5 B7 B8	C14 C33	D1 D4 D7 D11 D12
Know the at present existent technicians for the taking of data in field by means of the utilisation of different types of sensors, that allow the preparation of maps.	A2 A3 A4 A5	B2 B7	C14	D3 D5 D7
Know the principles of the representation and cartographic symbolisation.	A1 A2 A3 A4 A5	B1 B5 B7	C33	D1 D4 D5 D7 D11 D12
Relate and differentiate the distinct processes with territorial implications.	A2 A4	B1 B2 B5 B7	C27 C33	D1 D4 D7 D12
Know and understand the distinct phases of the process of territorial planning.	A2 A3 A4	B1 B5 B7 B8	C27 C33	D4 D5 D7 D11 D13
Be able to make and use a cartography of optimum location of uses or activities by means of *SIG.	A2 A3 A4 A5	B1 B5 B7	C27 C33	D1 D3 D4 D7 D12 D13
Know the problematic territorial specific of determinate areas of special interest and mining.	A1 A2 A4	B2 B5 B7 B8	C27 C33	D1 D3 D5 D7 D11 D12 D13

Purchase the basic knowledges in the normative field of the ordination of the territory.	A2 A3 A4	B5 B8	C27	D11 D12 D13
Know and apply software *SIG.	A3 A4 A5	B1 B7	C14 C33	D1 D4 D5 D7 D12 D13

Contents	
Topic	
*UT1 Projections and systems of reference. Geodesy.	*UD1 Projections and systems of reference. Geodesy
*UT2Sources of capture of information for the preparation of maps	*UD1. Sources of data *geoespaciales and access to the information *UD2. Systems of navigation and measurements *GNSS. *UD3. Photogrammetry and lifting *fotogramétrico.
*UT3.Systems of Geographic Information	*UD1. Cartographic representation: symbols and types of data. *UD2. Methods and processes of the territorial analysis in the systems of geographic information (*SIG). *UD3. *SIG For the evaluation *multicriterio and *multiobjetivo. *UD4. *SIG For the *geoprocesamiento of information *multimodal.
*UT4 The ordination of the territory and his relation with the environment	*UD1. Ordination of the territory and *minería sustainable. *UD2. Planning and territorial management. Planning *urbanística and integral. Stages. *UD3. The systems of geographic information in the ordination of the territory.

Planning			
	Class hours	Hours outside the classroom	Total hours
Lecturing	8	16	24
Problem solving	4	8	12
Practices through ICT	26	12	38
Mentored work	8	16	24
Portfolio/dossier	4	45.5	49.5
Objective questions exam	0.5	0	0.5
Problem and/or exercise solving	0.5	0	0.5
Laboratory practice	0.5	0	0.5
Essay	0.5	0	0.5
Portfolio / dossier	0.5	0	0.5
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Lecturing	Exhibition by part of the professor of the contents on the matter object of study, theoretical bases and/or guidelines of a work, exercise that the/the student has to develop
Problem solving	Activity in which they formulate problem and/or exercises related with the subject. The student has to develop the suitable or correct solutions by means of the *ejercitación of routines, the application of formulas or algorithms, the application of procedures of transformation of the available information and the interpretation of the results.
Practices through ICT	Activities of application of the knowledges to concrete situations and of acquisition of basic skills and *procedimentales related with the matter object of study. Activities of application of the knowledge in a determinate context in relation with the matter through the TIC.
Mentored work	The students elaborates a document works in group on the thematic of the matter and prepares memories, summaries of readings that present in the classroom
Portfolio/dossier	Compilation of the individual work of the students with the aim to show his efforts, progresses and attainments in the area of the matter. The compilation has to include so many contents proposed by the educational like other elected of autonomous form, explaining the criteria of selection and evidences of *autorreflexión.

Personalized assistance	
Methodologies	**Description**

Lecturing	Attention to the students in *tutorías and *telemáticamente. For all the modalities of teaching, the sessions of *tutorización will be able to make by telematic means (email, videoconference, forums of *Moovi,...) Under the modality of *concertación previous.
Problem solving	Attention to the students in *tutorías and *telemáticamente. For all the modalities of teaching, the sessions of *tutorización will be able to make by telematic means (email, videoconference, forums of *Moovi,...) Under the modality of *concertación previous.
Practices through ICT	Attention to the students in *tutorías and *telemáticamente. For all the modalities of teaching, the sessions of *tutorización will be able to make by telematic means (email, videoconference, forums of *Moovi,...) Under the modality of *concertación previous.
Mentored work	Attention to the students in *tutorías and *telemáticamente. For all the modalities of teaching, the sessions of *tutorización will be able to make by telematic means (email, videoconference, forums of *Moovi,...) Under the modality of *concertación previous.
Portfolio/dossier	Attention to the students in *tutorías and *telemáticamente. For all the modalities of teaching, the sessions of *tutorización will be able to make by telematic means (email, videoconference, forums of *Moovi,...) Under the modality of *concertación previous.

Assessment

	Description	Qualification	Training and Learning Results			
Objective questions exam	Theoretical examination related with the contents developed in the classroom lectures. Through this methodology, all the expected results in the subject are evaluated.	20	A1 A2 A3 A4 A5	B1 B2 B5 B7 B8	C14 C27 C33	D3 D5 D12
Problem and/or exercise solving	Theoretical examination related with the contents developed in the sessions of resolution of problems and exercises. Through this methodology, all the expected results in the subject are evaluated.	10	A1 A2 A3 A4 A5	B1 B2 B5 B7 B8	C14	D3 D7 D12
Laboratory practice	Periodic deliveries of practices guided in the face-to-face sessions in the classroom. Through this methodology, all the expected results in the subject are evaluated.	30	A1 A2 A3 A4 A5	B1 B2 B5 B7 B8	C14 C27 C33	D5 D7 D11 D13
Essay	It poses a tutorized work so that the students work in group, develop the competitions purchased along the course and do a systematic compilation in a document written. The different steps developed for the report technician will present in the classroom, by what the evaluation will take into account the coherence and the adequacy to this activity. Through this methodology, all the expected results in the subject are evaluated.	30	A1 A2 A3 A4 A5	B1 B2 B5 B7 B8	C27 C33	D1 D4 D5 D7 D11 D12 D13
Portfolio / dossier	It will review of periodic form the newspaper/portfolio of the students providing information to allow the evolution and the autonomy in the process of learning. Through this methodology, all the expected results in the subject are evaluated.	10	A1	B5 B7 B8	C14 C27 C33	D1 D5 D7 D11 D12 D13

Other comments on the Evaluation

Students can choose to waive the continuous assessment and request the overall assessment. This request will be scheduled after the first month of the lectures and will be possible during a time window of two (2) weeks.

The evaluation elements will be the following:

Continuous evaluation first opportunity:

Attendance at lectures is mandatory.

Non-extendable dates will be established throughout the school period for the periodic deliveries of the practices.

The tutored work will be delivered and defended in the last school weeks of the subject on a date to be defined.

The portfolio will be reviewed periodically and evaluated the day before the official exam date

The exam of objective questions and problem solving will take place on the same date, preferably, the official date of the first opportunity.

Continuous evaluation second opportunity

A practical delivery date will be set prior to the official second chance exam date.

In case it has been delivered, the evaluation of the supervised work of the first opportunity will be saved. In the event that said delivery has not been made or at the request of the students, the percentage of evaluation of the supervised work will be divided equally in the examination of objective questions and problem solving.

The portfolio will be reviewed and evaluated the day before the official second chance exam date.

The exam with objective questions and problem solving will take place on the official date of the second opportunity.

Global evaluation first and second opportunity:

A delivery related to the practices will be established with an evaluation percentage of 30%.

The exam with objective questions will account for 35% of the evaluation.

The problem solving exam will account for 35% of the evaluation.

All these tests and deliverables will be carried out on the official exam date.

Exam schedule. Verify/consult updated on the center's website:

http://minaseenerxia.uvigo.es/es/docencia/examenes

Sources of information

Basic Bibliography

Olaya, V., **Sistemas de información geográfica**, Cuadernos internacionales de tecnología para el desarrollo humano, 2009

Paul A. Longley, Michael F. Goodchild, David J. Maguire y David W. Rhind, **Geographic Information Science and Systems**, 978-1-118-67695-0, John Wiley & Sons, 2015

J. Allison Butle, **Designing Geodatabases for Transportation**, 978-1-58948-164-0, ESRI Press, 2008

Complementary Bibliography

Jesús Rodríguez Lloret y Rosa Olivella, **Introducción a los sistemas de información geográfica**, 2009

Salvador García-Ayllón Veintimilla, **Urbanismo y Ordenación del Territorio: manual de teoría**, UPCT, 2014

Recommendations

Subjects that it is recommended to have taken before

Construction management and on-site layout/V09G311V01306