



Teaching Guide						
Identifying Data				2018/19		
Subject (*)	Energy Resources		Code	610500012		
Study programme	Mestrado Universitario en Ciencias. Tecnoloxías e Xestión Ambiental (plan 2012)					
Descriptors						
Cycle	Period	Year	Type	Credits		
Official Master's Degree	2nd four-month period	First	Optional	3		
Language	SpanishGalicianEnglish					
Teaching method	Face-to-face					
Prerequisites						
Department	Física e Ciencias da TerraQuímica					
Coordinador	Cabeza Gras, Oscar	E-mail	oscar.cabeza@udc.es			
Lecturers	Cabeza Gras, Oscar Castro Garcia, Socorro Miguelez Pose, Fernanda	E-mail	oscar.cabeza@udc.es socorro.castro.garcia@udc.es fernanda.miguelez.pose@udc.es			
Web						
General description	This subject shows the energy actuality from three aspects: 1. Traditional energy sources. 2. Clean and renewable energy sources. 3. Technology, energy save and future developments.					

Study programme competences / results	
Code	Study programme competences / results
A17	Coñecer a problemática asociada coa enerxía e as súas fontes, as tecnoloxías más empregadas actualmente e as de futuro.
A18	Coñecer as implicacións económicas dos problemas ambientais, os instrumentos de política económica e os principais indicadores ambientais.
B2	Que os estudiantes saibam aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en contornas novas ou pouco coñecidas dentro de contextos más amplos (ou multidisciplinares) relacionados coa súa área de estudo.
B3	Que os estudiantes sexan capaces de integrar coñecementos e enfrentarse á complexidade de formular xuízos a partir dunha información que, sendo incompleta ou limitada, inclúa reflexións sobre as responsabilidades sociais e éticas vinculadas á aplicación dos seus coñecementos e suizos.
B4	Que os estudiantes saibam comunicar as súas conclusións e os coñecementos e razóns últimas que as sustentan a públicos especializados e non especializados dun modo claro e sen ambigüedades.
B6	Ser capaz de analizar datos e situacións, xestionar a información dispoñible e sintetizala, todo iso a un nivel especializado.
B8	Comprender, a un nivel especializado, as consecuencias do comportamento humano na contorna ambiental.
C4	Expresarse correctamente, tanto de forma oral coma escrita, nas linguas oficiais da comunidade autónoma.
C6	Utilizar as ferramentas básicas das tecnoloxías da información e as comunicacións (TIC) necesarias para o exercicio da súa profesión e para a aprendizaxe ao longo da súa vida.
C7	Desenvolverse para o exercicio dunha cidadanía aberta, culta, crítica, comprometida, democrática e solidaria, capaz de analizar a realidade, diagnosticar problemas, formular e implantar solucións baseadas no coñecemento e orientadas ao ben común.
C9	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrentarse.
C10	Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.
C11	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.

Learning outcomes		Study programme competences / results
Learning outcomes		Study programme competences / results



The past and present use of traditional energy sources will be analyzed. There will be different energy scenarios and the need for and possibility of developing energy infrastructures. The different energy markets and the current possibilities of saving energy will be analyzed. The most relevant aspects of the different renewable energies will be described, with an impact on the possibilities of savings and improvements in the energy efficiency they can produce. Finally, alternative energy technologies and their possible future development will be addressed	AC17 AC18	BC2 BC3 BC4 BC6 BC8 CC4 CC6 CC7 CC9 CC10 CC11
Know the sources of clean and renewable energy: wind, solar photovoltaic, solar thermal, undimutrix, tidal and nuclear fusion. It analyzes the current state of the subject and its evolution, as well as its future perspectives. The study documents are renewed annually.	AC17 AC18	BC2 BC3 BC4 BC6 BC8 CC4 CC6 CC7 CC9 CC10 CC11
Energy saving and management. New systems under study for the storage and generation of energy.		BC2 BC3 BC4 BC6 BC8

Contents		
Topic	Sub-topic	
Part I: Traditional Energy Sources:	Energy. Means. Transport, storage and distribution. Energy transformations. Power plants: Coal. Petroleum. Natural gas. Hydroelectric.	
Part II: Energy landscapes. Introduction to renewable energies	Coverage of primary and final energy demand. Wind power. High temperature solar and photovoltaic energy. Solar panels. Energy from the sea (tidal and wave). State of technology and types of devices. Nuclear power by fusion. Projects and perspectives.	
Part III: Energy saving and improvement in its efficiency. Alternative energy technologies and future developments.	Hydrogen and fuel cells, batteries, innovations in fossil fuels, ultracapacitors, solar energy through satellites, etc.	

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student's personal work hours	Total hours
Introductory activities	A17 C4 C6 C7 C9 C10 C11	1	1	2
Guest lecture / keynote speech	A18 B3 B4 B6 B8	9	18	27
Multiple-choice questions	B2 B6	1	4	5
Seminar	A18 B2 B6 C6	4	8	12
Case study	A17 A18 B3 B6 C4 C7 C9	4	8	12
Supervised projects	A17 A18 B2 B3 B4 B6 C4 C6 C9	2	14	16
Personalized attention		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	
Methodologies	Description



Introductory activities	Presentation of the different modules of the subject. Including the description of the Methodology, Program and Evaluation.
Guest lecture / keynote speech	Detailed explanation of the different aspects of the program. Computer Presentations and Whiteboard will be used for this.
Multiple-choice questions	Test type test on the contents explained in the lectures.
Seminar	Solving numerical problems, case studies or open discussion on a particular topic.
Case study	Experiments, calculations or procedures of treatment and analysis of data will be considered and developed, interpreting the results obtained.
Supervised projects	Individualized or paired work on the content of the subject

Personalized attention	
Methodologies	Description
Case study	The tutored work will be proposed by the teachers, so that the students can carry out their account, always having at their disposal to the Professor who will guide them in the bibliographical search, revise the work and clarifies dubbed calenda that can be presented.
Seminar	A personalized attention is designed to clarify the student aspects contained in the subject, both in the maxistral session and in the seminars.
Supervised projects	It is voluntary, but very advisable, to attend tutorials.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Case study	A17 A18 B3 B6 C4 C7 C9	Realización das tarefas encomendadas nos distintos casos a estudio.	20
Seminar	A18 B2 B6 C6	Realización das distintas tarefas plantexadas (problemas, discusíons críticas...)	20
Supervised projects	A17 A18 B2 B3 B4 B6 C4 C6 C9	Realización de traballos solicitados polos distintos profesores sobre temáticas contidas no programa da materia.	20
Multiple-choice questions	B2 B6	Exame tipo test sobre os contidos dos distintos módulos da materia.	20
Guest lecture / keynote speech	A18 B3 B4 B6 B8	Asistencia as clases e participación nas mesmas.	20
Others			

Assessment comments	
A minimum of assistance to keynote speeches (75%) is mandatory to be evaluated. If he/she do not assist that percentage will be evaluated as "Not Presented". The final qualification will be the average of that obtained in each of the three parts of the subject.	
First Oportunity	
- All activities, works and/or written test will be evaluated. Student must pass each of the three parts with 5/10 to be qualificated.	
Second Oportunity	
- Students must do all not passed activities/works and/or written test.	
- If the student do not assist the minimum written above, they must do, individually, all activities proposed of the subject.	
Students with partial dedication of assistance exencion.	
- They must inform the teacher the first week of the saubject.	
- First oportunity, They must do, individually, all activities proposed and the written tests.	
- Second oportunity, they must repeat the not passed activities.	

Sources of information



Basic	<ul style="list-style-type: none">- M. Kaltschmitt et al. (2007). Renewable energy: technology foundations, economical and environmental aspects. Holanda- SABUGAL GARCIA, SANTIAGO y GOMEZ MOÑUX, FLORENTINO (2006). CENTRALES TERMICAS DE CICLO COMBINADO: TEORIA Y PROYECTO. Diaz de Santos- García Alonso e Iranzo. (1989). La energía en la economía mundial y en España. Madrid. Editorial AC- IDAE (2000). impactos ambientales de la producción eléctrica. Madrid- R.M. Mujal Rosas (2005). Fuentes de energía eléctrica. Barcelona- IDAE (2004). Plan de Fomento de las Energías Renovables y Estrategia de Ahorro y Eficiencia Energética en España 2004-2012. Madrid- Inega (varios). Balance Enerxético de Galicia . Santiago de Compostela
Complementary	<ul style="list-style-type: none">- J.M. Escudero López (2004). Manual de energía eólica.... Madrid- M. Perlado, G. Valverde (1984). La fusión nuclear. Principios y Tecnología. Madrid- M. Alonso Abella (2005). Sistemas Fotovoltaicos. Introducción al diseño y dimensionado de instalaciones solares fotovoltaicas. Madrid- R. Clare (1994). Tidal power, Trends and Developments. Londres- J. W. Tester, E.M. Drake, M.J. Driscoll, M. W. Golay, W. A. Peters (2005). Sustainable Energy: Choosing among options. Boston

Recommendations

Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously

Subjects that continue the syllabus

Other comments

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.