



| Teaching Guide | | | | |
|--------------------------|---|--------|--|---------|
| Identifying Data | | | | 2021/22 |
| 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 | Ciencias da Navegación e Enxeñaría MariñaFísica e Ciencias da TerraQuímica | | | |
| Coordinador | | E-mail | | |
| Lecturers | Cabeza Gras, Oscar Romero Gómez, Manuel Señaris Rodriguez, Maria Antonia | E-mail | oscar.cabeza@udc.es m.romero.gomez@udc.es m.senaris.rodriguez@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. | | | |
| Contingency plan | <p>1. Modifications to the contents There will not be any modification.</p> <p>2. Methodologies *Teaching methodologies that are maintained All of them, but lectures will be on-line. *Teaching methodologies that are modified Laboratory practice will be done virtually. Data for analysis and representation will be given by the corresponding teacher.</p> <p>3. Mechanisms for personalized attention to students Moodle, Teams and e-mail.</p> <p>4. Modifications in the evaluation No modifications are contemplated. *Evaluation observations: Exams will be made virtual using Moodle.</p> <p>5. Modifications to the bibliography or webgraphy No modifications are contemplated.</p> | | | |

| Study programme competences / results | |
|---------------------------------------|--|
| Code | Study programme competences / results |
| A17 | Coñecer a problemática asociada coa enerxía e as súas fontes, as tecnoloxías máis 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 estudantes saiban aplicar os coñecementos adquiridos e a súa capacidade de resolución de problemas en contornas novas ou pouco coñecidas dentro de contextos máis amplos (ou multidisciplinares) relacionados coa súa área de estudo. |
| B3 | Que os estudantes sexan capaces de integrar coñecementos e enfrontarse 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 xuízos. |
| B4 | Que os estudantes saiban 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 enfrontarse. |
| 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 | | | |
|---|---------------------------------------|---------------------------------|--|
| 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, undimatrix, 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 scenarios. 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 Seminar Supervised projects | <p>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.</p> <p>A personalized attention is designed to clarify the student aspects contained in the subject, both in the maxistral session and in the seminars.</p> <p>It is voluntary, but very advisable, to attend tutorials.</p> |

Assessment

| Methodologies | Competencies / Results | Description | Qualification |
|--------------------------------|---------------------------------|--|---------------|
| Case study | A17 A18 B3 B6 C4 C7 C9 | Quality in the realization of the different case studies presented. | 20 |
| Seminar | A18 B2 B6 C6 | Realization of the different talks demanded by the teacher (problems, discussions criticisms...) | 20 |
| Supervised projects | A17 A18 B2 B3 B4 B6 C4 C6 C9 | Quality of the supervised projects proposed by the teacher | 20 |
| Multiple-choice questions | B2 B6 | Test exam about the different contents of the subject. | 20 |
| Guest lecture / keynote speech | A18 B3 B4 B6 B8 | Assistance and participation in the lectures. | 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 Opportunity

- All activities, works and/or written test will be evaluated. Student must pass each of the three parts with 5/10 to be qualified.

Second Opportunity

- 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 subject.
- First opportunity, They must do, individually, all activities proposed and the written tests.
- Second opportunity, they must repeat the not passed activities.

The fraudulent realization of the different test or activities for evaluation will imply the qualification of 0 in the corresponding call.

Sources of information

| | |
|----------------------|---|
| Basic | <ul style="list-style-type: none"> - M. Kaltschmitt et al. (2007). Renewable energy: technology foundations, economical and enviromental aspects. Holanda - SABUGAL GARCIA, SANTIAGO y GOMEZ MOÑUX, FLORENTINO (2006). CENTRALES TERMICAS DE CICLO COMBINADO: TEORIA Y PROYECTO. Diaz de Sasntos - 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

This subject is within the Green Campus Deal of the Science Faculty and many contents are directly connected with its point 8 objective: "To incorporate a environmental dimension in the research and teaching activities". Works asked to students for this subject must: a. Be in virtual format majority. b. If it were necessary to print them: - Plastics will not be used. - Prints in double face type. - Usage of recycled paper.

(*)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.