UNIVERSIDADE DA CORUÑA

| Teaching Guide | | | | |
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| Identifying Data | | | | 2022/23 |
| Subject (*) | Solar Systems | | Code | 730547002d |
| Study programme | Máster Universitario en Eficiencia Enerxética e Sustentabilidade (a distancia) | | | |
| Descriptors | | | | |
| Cycle | Period | Year | Type | Credits |
| Official Master's Degree | 1st four-month period | First | Obligatory | 4.5 |
| Language | SpanishGalician | | | |
| Teaching method | Non-attendance | | | |
| Prerequisites | | | | |
| Department | Enxeñaría Industrial | | | |
| Coordinador | Meizoso López, Maria del Carmen | E-mail | carmen.meizoso@udc.es | |
| Lecturers | Meizoso López, Maria del Carmen<br>Rodríguez Charlón, Santiago Ángel | E-mail | carmen.meizoso@udc.es<br>santiago.rodriguez.charlon@udc.es | |
| Web | | | | |
| General description | | | | |

| Study programme competences / results | |
|---|---|
| Code | Study programme competences / results |
| A7 | CE7 - Have knowledge of the fundamentals, potential, technology, applications and regulations of renewable energy sources |
| A8 | CE8 - Analyze and include renewable energies in different facilities |
| A10 | CE10 - Design and analyze solar harnessing systems |
| A13 | CE13 - Analyze, apply and optimize energy use systems |
| B2 | CB7 - That students know how to apply the knowledge acquired and their ability to solve problems in new or little-known environments within broader (or multidisciplinary) contexts related to their area of study |
| B6 | CG1 - Search and select alternatives considering the best possible solutions |
| B9 | CG4 - Extract, interpret and process information, from different sources, for use in the study and analysis |
| B13 | CG8 - Apply theoretical knowledge to practice |
| B16 | CG11 - Evaluate the application of emerging technologies in the field of energy and the environment |
| C2 | CT2 - Master the oral and written expression and comprehension of a foreign language |
| C3 | CT3 - Use the basic tools of information and communication technologies (ICT) necessary for the exercise of their profession and for learning throughout their lives |
| C6 | CT6 - Gain life skills and healthy habits, routines, and lifestyles |
| C8 | CT8 - Value the importance of research, innovation and technological development in the socioeconomic and cultural progress of society |

| Learning outcomes | | | |
|---|---|---|---|
| Learning outcomes | Study programme competences / results | | |
| Evaluate the solar resource | AC7 | BC9<br>BC13 | CC2<br>CC3 |
| Know solar thermal and photovoltaic installations, their components and associated maintenance procedures | AC8<br>AC10<br>AC13 | BC2<br>BC6<br>BC16 | CC6 |
| Assess the feasibility of solar installations | AC13 | BC16 | CC8 |
| Know the regulations applicable to solar installations | AC7 | | |

| Contents | |
|---|---|
| Topic | Sub-topic |

| | |
|---|---|
| Solar Resource Assessment. Sun geometry. Radiation Maps | Solar radiation, measures and data sources<br>Inclination angle<br>Shadings |
| Photovoltaic technology | Photovoltaic modules. Electrical properties. Temperature effect.<br>MPPT. Batteries. Charge controllers<br>Inverters<br>Design of photovoltaic systems<br>Electrical protections in the installation<br>Applicable regulations |
| Solar Thermal | Components<br>Facilities classification criteria<br>Captation system<br>Hydraulic system<br>Exchange system<br>Accumulation system<br>Control system<br>Installation calculation<br>Applicable regulations |
| Solar fuels and biofuels | Hydrogen production<br>Biofuels generated by solar energy |
| Solar thermal electricity technology | Concentration systems<br>Perspectives |

| Planning | | | | |
|---|---|---|---|---|
| Methodologies / tests | Competencies / Results | Teaching hours (in-person & virtual) | Student?s personal work hours | Total hours |
| Guest lecture / keynote speech | A7 | 14 | 14 | 28 |
| Problem solving | A8 A10 B2 B6 B9 B13 | 20 | 26 | 46 |
| Supervised projects | A7 A8 A10 A13 B13 B16 C2 C3 C6 C8 | 0 | 35 | 35 |
| Seminar | A7 A8 | 2 | 2 | 4 |
| Objective test | A7 B2 B13 C2 C3 | 2 | 5 | 7 |
| Personalized attention | | 5 | 0 | 5 |
| (*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students. | | | | |

| Methodologies | |
|---|---|
| Methodologies | Description |
| Guest lecture / keynote speech | The contents of the syllabus will be reviewed during the classes to expose the main concepts that will allow the student to carry out problems and related work. |
| Problem solving | Problems or assumptions related to the subject will be proposed and some sessions will be dedicated to the use of PVsyst for the design of photovoltaic plants. |
| Supervised projects | One or more solar energy projects will be proposed, for which a report will be presented and an oral presentation will be required. |
| Seminar | They will consist mainly of lectures given by professionals from the field. |
| Objective test | At the end of the term, on the dates established by the Master's calendar, there will be an objective test to assess the knowledge acquired in the subject, both in the classes and in the seminars. |

| Personalized attention | |
|---|---|
| Methodologies | Description |

| | |
|---|---|
| Supervised projects | The teachers will be available during tutoring hours to answer any questions or clarify any doubts that may arise during the course. |

| Assessment | | | |
|---|---|---|---|
| Methodologies | Competencies / Results | Description | Qualification |
| Problem solving | A8 A10 B2 B6 B9 B13 | During the course, problems will be proposed and students will have to solve them on their own in order to be assessed. | 20 |
| Objective test | A7 B2 B13 C2 C3 | On the official dates established by the Master's calendar there will be an objective test. | 30 |
| Supervised projects | A7 A8 A10 A13 B13 B16 C2 C3 C6 C8 | The project shall consist of the design of solar energy installations. The specifications will be published in advance. An explanatory report justifying the work carried out will be submitted. An oral presentation of the results and conclusions will be made. | 50 |

| Assessment comments |
|---|
| In the 2nd opportunity the<br>evaluation will consist of the delivery of a project (50%) and taking of an<br>objective test (30%), maintaining the same mark obtained during the course in<br>the problem solving part (20%). |

| Sources of information | |
|---|---|
| Basic | - Arno Smets, Klaus Jäger, Olindo Isabella, René van Swaaij,Miro Zeman (). Solar Energy: The Physics and Engineering of Photovoltaic Conversion, Technologies and Systems. Amazon<br>- (). https://www.pveducation.org/. |
| Complementary | |

| Recommendations |
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| Subjects that it is recommended to have taken before |
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| Subjects that are recommended to be taken simultaneously |
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| Subjects that continue the syllabus |
| |
| Other comments |
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**(*)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.**