UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2022/23
Subject (*)	Solar Systems		Code	730547002
Study programme	Máster Universitario en Eficiencia Enerxética e Sustentabilidade			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	First	Obligatory	4.5
Language	SpanishGalician			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría Industrial			
Coordinador	Meizoso López, Maria del Carmen	E-mail	carmen.meizoso@udc.es	
Lecturers	Meizoso López, Maria del Carmen Rodríguez Charlón, Santiago Ángel	E-mail	carmen.meizoso@udc.es santiago.rodriguez.charlon@udc.es	
Web				
General description	The main objetive of this course is to describe the technologies, regulations and future prospects of solar energy systems			

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 BC13	CC2 CC3
Know solar thermal and photovoltaic installations, their components and associated maintenance procedures	AC8 AC10 AC13	BC2 BC6 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 Inclination angle Shadings
Photovoltaic technology	Photovoltaic modules. Electrical properties. Temperature effect. MPPT. Batteries. Charge controllers Inverters Design of photovoltaic systems Electrical protections in the installation Applicable regulations
Solar Thermal	Components Facilities classification criteria Captation system Hydraulic system Exchange system Accumulation system Control system Installation calculation Applicable regulations
Solar fuels and biofuels	Hydrogen production Biofuels generated by solar energy
Solar thermal electricity technology	Concentration systems 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
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
Objective test	A7 B2 B13 C2 C3	On the official dates established by the Master's calendar there will be an objective test.	30

Assessment comments
In the 2nd opportunity the evaluation will consist of the delivery of a project (50%) and taking of an objective test (30%), maintaining the same mark obtained during the course in 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 - (). https://www.pveducation.org/.
Complementary	

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.