UNIVERSIDADE DA CORUÑA

Teaching Guide			
Identifying Data			2019/20
Subject (*)	Distributed Generation, Polygeneration and Micropower-Nets. Smartgrid	Code	770523012
Study programme	Mestrado Universitario en Eficiencia e Aproveitamento Enerxético		

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	Enxeñaría Industrial		
Coordinador	Masdias y Bonome, Antonio	E-mail	antonio.masdias@udc.es
Lecturers	Masdias y Bonome, Antonio	E-mail	antonio.masdias@udc.es
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General description	The course aims to give an introduction to electrical microgrids and generation systems employed therein providing the fundamentals and important issues that address the various technologies used in distributed generation systems. the importance and characteristics of decentralized generation systems over conventional systems is introduced. Finally, hybrid systems that combine two or more technologies of energy generation and storage, as well as cogeneration and trigeneration systems are studied.		

Study programme competences / results	
Code	Study programme competences / results
A1	Análise e aplicación de metodoloxías e normativa para unha xestión eficiente da enerxía.
A2	Análisis e implantación de medidas de ahorro y eficiencia energética en los sectores industrial, terciario y residencial.
A16	Capacidad para buscar, analizar, identificar y aplicar nuevas fuentes de energía eléctrica o nuevas técnicas de gestión de la electricidad bajo criterios como eficiencia, sostenibilidad o cooperación, así como el empleo de éstas sobre nuevas aplicaciones.
B1	Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.
B2	Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios.
B3	Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.
B4	Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.
B10	Potenciar la creatividad.
B15	Conocer la legislación vigente y reglamentación aplicable al sector de las energías renovables y de la eficiencia energética.
C2	Fomentar la sensibilidad hacia temas medioambientales.
C3	Aplicar una metodología que fomente el aprendizaje y el trabajo autónomo.
C5	Adquirir la capacidad para elaborar un trabajo multidisciplinar

Learning outcomes			
Learning outcomes	Study programme competences / results		
Concepts and terms of generation, cogeneration and polygeneration and the different elements in electrical networks and micro-networks.	AJ16		

Knowledge of elements used in micro-networks, generating elements with or without renewable energies and energy storage elements and elements of consumption or energy supply to specific loads.		BC10 BC15	
Know the basic methods and processes related to the elements that are part of micro-networks that have notability from a point of view of energy efficiency.	AJ1 AJ2	BC2 BC3	CC5
Have knowledge to understand the fundamentals of intelligent micro-networks, as well as managing the interconnection between micro-networks within analysis of energy efficient.		BC1 BC4	CC2 CC3

Contents	
Topic	**Sub-topic**
BLOCK 1: Distributed generation, opportunity and development needs.	Regulatory framework Integration of Generation (Autoconsumo and net balance) Counters and deployment of Network Management Equipment Customer participation in the Electricity Market
BLOCK 2: polygeneration.	New technologies for generation, storage and distribution.
BLOCK 3: Managing Energy Networks Smart Grid and Smart Metering	Infrastructure and Control Technologies Smart Network Devices As advanced infrastructure Implementation and management of distributed energy resources Advanced network management. EMS systems

Planning				
Methodologies / tests	**Competencies / Results**	**Teaching hours (in-person & virtual)**	**Student?s personal work hours**	**Total hours**
Case study	A1 A2 A16 C5	5	10	15
ICT practicals	B3 B1 B2 B10 C2 C3	7	20	27
Objective test	B4 B15	2	0	2
Guest lecture / keynote speech	A1 A2 A16	9	21	30
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**
Case study	Case studies will be exposed cases to illustrate the application of the theoretical and practical Contender exposed in lectures
ICT practicals	Practices through ICT includes the preparation of jobs that may be assisted by ICT both Moodle and in the laboratory.
Objective test	Objective test consists of a theoretical and practical examination in which knowledge and skills acquired skills are evaluated.
Guest lecture / keynote speech	Lecture Exhibition of the basics and work methodologies to develop distribution facilities, etc. polygeneration

Personalized attention	
Methodologies	**Description**

Case study ICT practicals	personalized attention and monitoring both case studies and the preparation and development of laboratory practice is performed. Attention and monitoring refers not only to classroom attention but assisted by ICT or e-mail.

Assessment			
Methodologies	Competencies / Results	Description	Qualification
Case study	A1 A2 A16 C5	Different case studies will be evaluated by the teacher will be analyzed.	40
ICT practicals	B3 B1 B2 B10 C2 C3	It includes the development of practices both assisted and laboratory data may be made with both real and virtual instrumentation.	10
Objective test	B4 B15	Theoretical and practical test that must be overcome by the student and which aims to quantify the knowledge and skills acquired.	50

Assessment comments

Sources of information	
Basic	- IEEE (2013). IEEE 1547 Standard for Interconnecting Distributed Resources. - Fundación de la Energía de la CCAA Madrid (2012). Guia de Microgeneración. Madrid. - James Momoh (2012). SMART GRIDS Fundamentals of Design and Analisys. New Jersey. USA - David Flin (2010). Cogeneration. UK - ANTONIO COLMENAR SANTOS (2015). GENERACIÓN DISTRIBUIDA, AUTOCONSUMO Y REDES INTELIGENTES. Madrid 2015
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.