Teaching Guide				
Identifying Data				2016/17
Subject (*)	Sistemas de Coxeración e Biomasa		Code	770523003
Study programme	Mestrado Universitario en Eficiencia e Aproveitamento Enerxético			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	1st four-month period	First	Obligatoria	6
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría Industrial			
Coordinador	Casteleiro Roca, José Luis	E-mail	jose.luis.casteleiro@udc.es	
Lecturers	Casteleiro Roca, José Luis	E-mail	jose.luis.casteleiro@udc.es	
Web				
General description	This subject aims to give students theoretical knowledge of various types and operations systems Cogeneration and Biomass used in Power Generation.			

Study programme competences	
Code	Study programme competences
A7	Capacidad para el diseño y análisis de sistemas de cogeneración.
A8	Capacidad para el diseño y análisis de sistemas de biomasa.
A9	Tener conocimiento de los fundamentos, potencial, tecnología, aplicaciones y normativa de fuentes de energía renovables.
A10	Capacidad para analizar e incluir energías renovables en diferentes instalaciones.
A12	Capacidad para la toma de decisiones en un entorno tecnológico donde los materiales se utilicen en aplicaciones de eficiencia
A13	Capacidad para analizar, aplicar y optimizar los sistemas de aprovechamiento energético.
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.
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.
B11	Adquirir nuevos conocimientos y capacidades relacionados con el ámbito profesional del máster.
B14	Aplicar conocimientos de ciencias y tecnologías avanzadas a la práctica profesional o investigadora de la eficiencia
C3	Aplicar una metodología que fomente el aprendizaje y el trabajo autónomo.
C5	Adquirir la capacidad para elaborar un trabajo multidisciplinar
C6	Dominar la expresión y la comprensión de un idioma extranjero.

Learning outcomes			
Learning outcomes	Study programme competences		
Knowing the environmental issues relating to electric power generation	AJ9 AJ13	BC1 BC11	CC5
Analyze and know how to design cogeneration systems	AJ7 AJ12	BC11 BC14	CC3
Analyze and know how to design biomass generation systems	AJ8 AJ10	BC4 BC11	CC6

Contents	
Topic	Sub-topic
Topic 1: Environmental considerations	1.1. Environmental problems 1.2. Solutions to environmental problems. Renewable energy

Topic 2: Use of waste heat. Cogeneration	2.1. General aspects of cogeneration 2.2. Technology applied to cogeneration and trigeneration 2.3. Cogeneration and trigeneration power stations
Topic 3: Biomass	3.1. Energy sources 3.2. Municipal Solid Waste 3.3. Process of using biomass 3.4. Domestic applications

Planning				
Methodologies / tests	Competencies	Ordinary class hours	Student?s personal work hours	Total hours
Guest lecture / keynote speech	A7 A8 B4 B11 C5 C6	20	55	75
Laboratory practice	A12 A13 B1 B14 C3 C5	30	25	55
Objective test	A7 A8 A9 A10 B1 B11	3	15	18
Personalized attention		2	0	2
(*)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	Keynote speech complemented with the use of audiovisual media and the introduction of some questions to students, in order to transmit knowledge and facilitate learning. The order of the topics covered will not have to be the one described in the teaching guide. In addition, there will be topics that can be seen together on the development of others, and the division between them may not be strict.
Laboratory practice	Performing laboratory practice as far as possible; or, failing that, solving exercises and specific problems in the classroom, from the knowledge explained.
Objective test	It consists in carrying out an objective test of approximately 3 hours, in which the acquired knowledge will be evaluated.

Personalized attention	
Methodologies	Description
Laboratory practice	The student has the relevant meetings of personalized tutorials, to resolve the concerns arising from the matter.

Assessment			
Methodologies	Competencies	Description	Qualification
Laboratory practice	A12 A13 B1 B14 C3 C5	Some tasks established in the subject, within the framework of this methodology	25
Objective test	A7 A8 A9 A10 B1 B11	Exam type objective test	75

Assessment comments
As part of the "Laboratory practice" may include aspects such as attendance, personal work, proposed personal work, attitude, etc., to help to pass the subject. The "Objective test" will be divided into a theoretical and practical part. It is necessary to exceed 50% of the score in the theoretical part of the "Objective test" to approve, as well as having made and approved the work proposed in the "Laboratory practice".

Sources of information	
Basic	- Sala Lizarraga, José María (1994). Cogeneración : aspectos termodinámicos, tecnológicos y económicos. Bilbao: Universidad del País Vasco, Servicio Editorial - García Garrido, Santiago (2012). Centrales termoeléctricas de biomasa. Fuenlabrada: Renovetec
Complementary	- Villares Martín, Mario (2003). Cogeneración. Madrid: Fundación Confemetal - Boyce, Meherwan P. (2010). Handbook for cogeneration and combined cycle power plants. New York: ASME

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.