Teaching Guide				
Identifying Data				2016/17
Subject (*)	Applications to environmental protection		Code	730495006
Study programme	Mestrado Universitario en Materiais Complexos: Análise Térmica e Reoloxía (plan 2012)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	2nd four-month period	First	Obligatoria	3
Language	English			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría Industrial 2			
Coordinador	López Beceiro, Jorge José	E-mail	jorge.lopez.beceiro@udc.es	
Lecturers	Artiaga Diaz, Ramon Pedro López Beceiro, Jorge José	E-mail	ramon.artiaga@udc.es jorge.lopez.beceiro@udc.es	
Web	http://complexmaterials.wikispaces.com			
General description	Analysis using different experimental techniques gases emitted / absorbed in different processes. Substituting synthetic polymers biopolymers. Value the study of waste minimization / elimination.			

Study programme competences / results	
Code	Study programme competences / results
A1	Set up and conduct tests using the techniques of thermal analysis and rheology most appropriate in each case, within the scope of complex materials
A6	Understanding the importance of the environment and of the research focused on the elimination/minimization of final or process wastes
B1	Knowledge and understanding to provide a basis or opportunity for originality in developing and / or applying ideas, often in a research context
B2	The students have the skill to apply their knowledge and their ability to solve problems in new or unfamiliar contexts within broader (or multidisciplinary) contexts related to their field of study
B4	That the students can communicate their conclusions and the knowledge and last reasons behind that conclusions to specialized and non specialized audience in a clear and unambiguous way
B7	Solving problems effectively
B8	Applying a critical, logical and creative way of thinking
B11	Behave with ethics and social responsibility as a citizen and as a professional
B14	Ability to find and manage the information
B21	To assess the importance of research, innovation and technological developments in the socio-economic and cultural progress of society
B22	Understand the importance of protecting the environment
C2	Have a good command of spoken and writing expression and understanding of a foreign language.
C4	Developing for the exercise of an open, educated, critical, committed, democratic and solidary citicenship, able to analyze reality, diagnose problems, formulate and implement solutions based on knowledge and oriented to the common good.
C7	To assume as a professional and citizen the importance of learning throughout life.
C9	Appreciate the importance of research in environmental protection

Learning outcomes	
Learning outcomes	Study programme competences / results

Ability to analyze using different experimental techniques gases emitted / absorbed in different processes	AR1 AR6	BR1 BR2 BR4 BR7 BR8 BR11 BR14 BR21 BR22	CR2 CR4 CR7 CR9
Recognize the importance of replacing synthetic polymers for biopolymers	AR6	BR1 BR2 BR4 BR7 BR8 BR11 BR14 BR21 BR22	CR2 CR4 CR7 CR9
Appreciating the study of waste for minimization / elimination	AR6	BR1 BR2 BR4 BR7 BR8 BR11 BR14 BR21 BR22	CR2 CR4 CR7 CR9

Contents	
Topic	**Sub-topic**
Analysis of the combustion gases by TG-FTIR	Degradation in oxidizing and inert atmosphere Products of combustion Component Identification by FTIR
Evaluation of the absorption of harmful gases by TG	Characteristics of absorbent substrates Influence of absortion temperature Influence of concentration and gas flow Setting up an experiment to evaluate the absorption of gases
Rheology of fuel marine waste	General characteristics of fuel marine waste Rheological properties of interest Thermal and rheological characterization
Substitution of synthetic polymers by biopolymers	Methods for obtaining biopolymers Main biopolymers Compared to synthetic polymers Possibilities and prospects of replacing synthetic polymers for biopolymers

Planning				
Methodologies / tests	**Competencies / Results**	**Teaching hours (in-person & virtual)**	**Student?s personal work hours**	**Total hours**
Guest lecture / keynote speech	A6 B1 B11 B21 B22 C4 C9	10	10	20

Laboratory practice	A1 B2 B7 C7	15	9	24
Supervised projects	A1 B2 B4 B7 B8 B11 B14 B21 C2	2.5	22.5	25
Objective test	A6 B4 B8 C2 C9	1	0	1
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	Presentation given by the professor, on a schematic basis, focusing on the main topics, covering both theoretical and practical issues.
Laboratory practice	Performance of practical activities such as demonstrations, exercises, experiments, etc..
Supervised projects	Activities whose purpose is that the students enlarge the study of the topics pesented in the program and consolidate their acquired knowledge and capabilities. These activities should also help the students learn and improve their capabilities in literature survey.
Objective test	Exam that will help to evaluate the knowledge and competencies acquired by the students.

Personalized attention	
Methodologies	**Description**
Objective test Guest lecture / keynote speech Laboratory practice Supervised projects	The personalized attention to students, understood as a support in the teaching-learning process, will take place in the hours of tutoring of the professor.

Assessment			
Methodologies	**Competencies / Results**	**Description**	**Qualification**
Objective test	A6 B4 B8 C2 C9	Examination or objective test.	20
Guest lecture / keynote speech	A6 B1 B11 B21 B22 C4 C9	Continuous assessment through monitoring of student work in the classroom, laboratory and / or tutorials.	10
Laboratory practice	A1 B2 B7 C7	Continuous assessment through monitoring of student work in the classroom, laboratory and / or tutorials.	10
Supervised projects	A1 B2 B4 B7 B8 B11 B14 B21 C2	Presentation (oral and written) of the supervised work.	60

Assessment comments

Sources of information	
Basic	Nesta materia traballásese con distintos artigos científicos procedentes de revistas oun con teses doutorais como:Estudio térmico de maderas [Recurso electrónico] / autora, María Teresa Sebio Puñal ; directores, Ramón Pedro Artiaga Díaz [y] Salvador Naya Fernández. Sebio Puñal, María Teresa. Biblioteca central -- TE.UDC-433 CD-ROM --Journal of Thermal Analysis and CalorimetryEnergy Conversion and ManagementThermochimica ActaEnergy & FuelsEnvironmental Research LettersOs artigos estarán relacionados coas técnicas analíticas estudadas e o medio ambiente.
Complementary	

Recommendations
Subjects that it is recommended to have taken before

Physical-chemistry of polymers/730495011
Subjects that are recommended to be taken simultaneously
Introduction to complex materials/730495001 Vicoelasticity of materials/730495002 Thermo-mechanical properties of materials. Fundamental Methods/730495003
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.