Teaching Guide				
Identifying Data				2018/19
Subject (*)	Thermal treatments and analysis by laser		Code	730495007
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	Optional	2
Language	English			
Teaching method	Face-to-face			
Prerequisites				
Department	Enxeñaría Naval e Industrial			
Coordinador	Nicolas Costa, Gines	E-mail	gines.nicolas@udc.es	
Lecturers	Nicolas Costa, Gines	E-mail	gines.nicolas@udc.es	
Web				
General description	This course aims to describe the characterization of materials by laser analysis (especially on plasma emission spectroscopy induced by laser) and induced thermal effects.			

Study programme competences	
Code	Study programme competences
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
A5	Understanding the relationships between structure and properties of materials
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
B3	That students are able to integrate knowledge and handle complexity, and formulate judgments from an information that, being limited or not complete, includes reflections on the social and ethical responsibilities linked to the application of their knowledge and judgments
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
B8	Applying a critical, logical and creative way of thinking
B9	To work autonomously with initiative
B13	Analysis-oriented attitude
B14	Ability to find and manage the information
B15	Ability to communicate orally and in writing
B17	Analyze and decompose processes
B21	To assess the importance of research, innovation and technological developments in the socio-economic and cultural progress of society
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.
C6	Critically assessing the knowledge, technology and information available to solve the problems they face with.
C7	To assume as a professional and citizen the importance of learning throughout life.
C8	To assess the importance of research, innovation and technological development in the socio-economic and cultural progress of society.

Learning outcomes	
Learning outcomes	Study programme competences

	AR1 AR5	BR2 BR3 BR4 BR8 BR9 BR13 BR14 BR15 BR17 BR21	CR2 CR4 CR6 CR7 CR8

Contents	
Topic	**Sub-topic**
The following blocks or topics develop the contents established in the Verification Report, which are:	Laser irradiation of the material and subsequent thermal effects. Treatments by laser heating. Laser-based instrumental methods for analysis and characterization of materials.
1. Laser fundamentals	1.1 Basic laser mechanisms 1.2 Optics and beam manipulation 1.3 Types of lasers
2. Laser heat treatment	2.1 Interaction phenomena 2.2 Basic regimes of the heating 2.3 Types of heat treatments
3. Laser analysis	3.1 Fundamentals of laser spectroscopy 3.2 Types of laser spectroscopy techniques 3.3 Laser induced plasma spectroscopy

Planning				
Methodologies / tests	**Competencies**	**Ordinary class hours**	**Student?s personal work hours**	**Total hours**
Document analysis	B2 B3 B4 B8 B9 B13 B14 B15 B17 C2 C4 C6 C7 C8	0	13	13
Guest lecture / keynote speech	A1 A5 B15 B21 C2	30	5	35
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**
Document analysis	Work will be made on a specific technique based on scientific papers
Guest lecture / keynote speech	Presentation with slides

Personalized attention	
Methodologies	**Description**
Document analysis	Discussion about how focusing the report No academic dispensation accepted.

Assessment

Methodologies	Competencies	Description	Qualification
Document analysis	B2 B3 B4 B8 B9 B13 B14 B15 B17 C2 C4 C6 C7 C8	Quality of the scientific report about the proposed theme	100

Assessment comments

Sources of information	
Basic	- C.D. Davis (1996). Lasers and Electro-Optics. Cambridge - A.M. Prokhorov (1990). Laser Heating of Metals. Adam Hilger - W. Demtröder (1996). Laser spectroscopy basic concepts and instrumentation. Springer - D.A. Cremers (2006). Handbook of Laser-induced Breakdown Spectroscopy. Wiley
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
Para axudar a conseguir unha contorna inmediata sostido e cumprir co obxectivo da acción número 5: ?Docencia e investigación saudable e sustentable ambiental e social? do "Plan de Acción Green Campus Ferrol", realízanse as seguintes recomendaciones: -Facer un uso sostenible dos recursos e a prevención de impactos negativos sobre o medio natural -A entrega dos traballos documentales que se realicen nesta materia: ?Realizarase a través de Moodle, en formato digital sen necesidade de imprimilos ?En caso de ser necesario realizalos en papel: -Non se empregarán plásticos -Realizaranse impresións a dobre cara. -Empregarase papel reciclado. -Evitarase a impresión de borradores