



IDENTIFYING DATA

(*)Aplicacións Medioambientais dos Láseres

Subject	(*)Aplicacións Medioambientais dos Láseres			
Code	O01M117V01104			
Study programme	(*)Máster Universitario en Fotónica e Tecnoloxías do Láser			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	1st	1st
Teaching language				
Department				
Coordinator	Michinel Álvarez, Humberto Javier			
Lecturers	López Díaz, Ana Jesús Michinel Álvarez, Humberto Javier Ramil Ramil Rego, Alberto			
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Web	http://laserphotonics.org			
General description	In this subject we study those applications related analytical capabilities of the laser. There are also chapters dedicated to applications like digital holography or speckle interferometry.			

Competencies

Code	
C3	Capacity for analysis and argumentation of the fundamentals of radiation -matter classical, semi -classical and quantum level interaction, theoretical foundations of laser performance, physical optics, and the interplay of light in different ways and according to different scales.
C4	Capacity for identification and description of optical laser sensors and actuators , including integrated sensors and optical fibers and their applications in various fields and recognition of commercial systems.
D1	Leadership skills, decision making and time management.
D5	Initiative and entrepreneurship , stimulated by training in the field of photonics and laser technology.

Learning outcomes

Expected results from this subject	Training and Learning Results
(*)Conocer y aprender a manejar la legislación aplicable a la gestión de residuos.	
(*)	
Development of the processes of analysis.	C4
Knowledge of the distinct analytical processes	C3
	D1
Analysis of the data obtained in each one of the processes.	C4
	D5

Contents

Topic	
Introduction	The environmental context Analytical techniques Applications (residual waters, atmosphere[])
Laser-Induced Fluorescence	Foundations Instrumentation Applications

Spectroscopy of plasmas	LIBS ICP-Masses
LIDAR	Introduction Configurations (Rayleigh-Mie, DIAL, Doppler, Raman) Applications
Other applications	Holography (matrix assisted laser desorption ionization) REMPI-TOFMS (resonance enhanced multi-photon time-of-flight mass spectrometry)

Planning

	Class hours	Hours outside the classroom	Total hours
Troubleshooting and / or exercises	10	0	10
Autonomous troubleshooting and / or exercises	0	100	100
Master Session	38	0	38
Multiple choice tests	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

	Description
Troubleshooting and / or exercises	The professor will resolve in the class the exercises and problems that will serve of model for which the student will have to resolve of autonomous way.
Autonomous troubleshooting and / or exercises	The student will resolve of autonomous way the problems and exercises proposed by the professor of the subject
Master Session	The professor will expose the main concepts of the subject with the support of the educational material that estimate timely to employ in the class

Personalized attention

Methodologies	Description
Autonomous troubleshooting and / or exercises	Voluntary tutorship. Advice in the realization of the different proofs well of individual form us time of tutorship or through the forum of on-line debate.

Assessment

	Description	Qualification	Training and Learning Results
Autonomous troubleshooting and / or exercises	Periodic delivery of collections of problems autonomously made by the student	50	
Multiple choice tests	Test with multi-option questions	50	

Other comments on the Evaluation

Sources of information

Celio Pasquini, Juliana Cortez, Lucas M. C. Silva y Fabiano B. Gonzaga,, **Laser Induced Breakdown Spectroscopy**, , J. Braz. Chem. Soc.,
A.W. Miziolek, V. Palleschi, I. Schechter, **Laser-induced breakdown spectroscopy: Fundamentals and applications**, Cambridge University Press,

Recommendations