



IDENTIFYING DATA

Laser Sensors: Fundamentals and Applications

Subject	Laser Sensors: Fundamentals and Applications			
Code	O01M117V01105			
Study programme	(*)Máster Universitario en Fotónica e Tecnoloxías do Láser			
Descriptors	ECTS Credits 6	Choose Optional	Year 1st	Quadmester 1st
Teaching language				
Department				
Coordinator	Michinel Álvarez, Humberto Javier			
Lecturers	Michinel Álvarez, Humberto Javier Moreno de las Cuevas, Vicente			
E-mail	hmichinel@uvigo.es			
Web	http://laserphotonics.org			
General description	<p>In this course we study sensors based on lasers that can be used in the free propagation or guided (for example, optical fibre) with a high degree of adaptability to the type of measure and the characteristics of the objects.</p> <p>On the other hand, in combination with the detectors and the electronic processors , what allows the follow-up of interesting parameters in real time, what results in the maximum interest in the industrial processes , in the field of the biomedical applications, and the structures of the engine and of control, such like airplanes , ships, bridges , etc.</p>			

Competencies

Code	
A5	That the students have the learning skills that enable them to continue studying in a way that will be largely self-directed or autonomous.
B1	Ability to gather information about a topic of interest through scientific papers as well as to analyze , classify and summarize it.
C6	Ability to use optical instrumentation and the manufacture and assembly of experiments based on techniques of laser and photonics technologies and their applications, autonomously.
D4	Capacity for independent learning, self-organization and self-scheduling of work, and to maintain continuous training in their field of work.

Learning outcomes

Expected results from this subject	Training and Learning Results
Determination of the characteristics of the light required for sensing the parameter under consideration	D4
Selection of the sources and suitable detectors to the problem of measure	A5 B1
Capacity of selection of the systems guided or of free propagation in function of external variables	D4
Correct handle of the sources of information and technical specifications	C6 D4

Contents

Topic	
Introduction	Detection and measurement with light Classical and quantum principles of radiation-matter interactions

Light sources and detectors	Semiconductors Diode lasers Photodetectors
Interferometric sensors	Interferometry and coherence Types of interferometers Types of interferometers used like sensors optical Modulators
Non-interferometric sensors	Polarimetric sensors Speckle sensors
Dimensional measurement	Measurements in 1D,2D and 3D
Measure of deformations	Shearing interferometers Bragg fibre interferometers
Measurement of dynamic processes	Measure of vibration Measured of field of speeds

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	
Autonomous troubleshooting and / or exercises	(*)O alumno resolverá de xeito autónomo os problemas e exercicios propostos polo profesor da asignatura
Master Session	(*)O profesor exporá os principais conceptos da asignatura co apoio do material docente que estime oportuno a empregar na clase

Personalized attention

Methodologies	Description
Autonomous troubleshooting and / or exercises	System of individual and group tutorship.

Assessment

	Description	Qualification	Training and Learning Results
Autonomous troubleshooting and / or exercises	(*)Entrega periódica de boletines de problemas realizados de xeito autónomo	50	
Multiple choice tests	(*)Examen tipo test con preguntas multiopción.	50	

Other comments on the Evaluation

Sources of information

Keigo Iizuka., -Elements of Photonics Vol I & II , John Wiley & Sons,
Jia-Ming Liu, Photonic Devices , . Cambridge University Press,
J.M. Abella, J.M. Martínez-Duart, F. Agulló-Rueda., Fundamentos de Microelectrónica., nanoelectrónica y fotónica , Prentice-Hall.,
Optical Methods of Measurement., Rajpal S. Sirohi & Fook Siong Chau , Marcel Dekker INC,

Recommendations