



IDENTIFYING DATA

Laboratory on the Fundamentals of Laser

Subject	Laboratory on the Fundamentals of Laser			
Code	O01M117V01107			
Study programme	(*)Máster Universitario en Fotónica e Tecnoloxías do Láser			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	1st	1st
Teaching language				
Department				
Coordinator	Salgueiro Piñeiro, Jose Ramon			
Lecturers	Salgueiro Piñeiro, Jose Ramon			
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Web	http://laserphotonics.org			
General description	The subject, of 6 ECTS, consists in one joint of practical experiences and applications of the lasers to be done in the optics laboratory at the Faculty of Sciences in the campus of Ourense. The experiences cover a wide spectrum of aspects related with the lasers and provide a solid base to the experimental methods in photonics.			

Competencies

Code	
A2	That the students can apply their knowledge and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
A4	That the students can communicate their conclusions , and the knowledge and rationale underpinning these , to specialist and non-specialist audiences clearly and unambiguously.

Learning outcomes

Expected results from this subject	Training and Learning Results
Skill in the handle of instruments of laboratory of photonics	A2
New	
Introduce the student to the techniques of experimental work with lasers	A4
Development of collaborative strategies in a laboratory	A2

Contents

Topic	
Measure of the modes of a planar waveguide.	Experimental set up to couple light to the planar guide by means of a prism. Analysis of data to build the index profile.
Optical vortex	Vortex generation using a holographic mask Vortex generation using a bimodal optical fiber
Laser diode	Measuring the lasing threshold of a laser diode. Effect of temperature on the laser power. Design of a power supply to control optical power of the laser diode.
He-Ne laser	Measurement of the laser beam profile Measuring the transmittance of materials.
Interference and diffraction	Construction of a Michelson interferometer. Construction of a Mach-Zender interferometer Measurement of the wavelength of a laser Measurement of the size of a microscopic aperture

Holography	Mounting a setup for hologram recording Processing techniques: development Holographic reconstruction
Hyperfine structure of rubidium	Mounting a setup to register the absorption spectrum of rubidium.
Optical tweezers	Improving the setup to eliminate Doppler broadening Adjusting and tuning a system to trap microparticles using a laser Video recording containing the process of selection and trapping of the microparticles

Planning

	Class hours	Hours outside the classroom	Total hours
Troubleshooting and / or exercises	0	80	80
Laboratory practises	48	0	48
Reports / memories of practice	2	20	22

*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 Student will realize the treatment and analysis of derivative data of the measures to obtain the results, applying the necessary theory.
Laboratory practises	The students will realize experiences in the laboratory envelope the fundamental concepts of the subject

Personalized attention

Methodologies	Description
Laboratory practises	Customized attention in the laboratory, where the professor is available for the students to solve all contingencies arising from the development of the experiments. Help to the realization of different tasks by means of a personal interview or through the email or a telematic platform.

Assessment

	Description	Qualification	Training and Learning Results
Laboratory practises	Attitude in the laboratory. Skills putting the different experiments together and measuring and treating experimental data.	30	A2
Reports / memories of practice	Realization of a brief inform of every experiment, compiling relevant information, measurements, data analysis and conclusions.	60	A4
	Exposition and defence in 10min time of one of the practices realized at the laboratory and answers to the questions from the lecturer and other members of the auditorium.		

Other comments on the Evaluation

Sources of information

- B. E. A. Saleh & M. C. Teich, "Fundamentals of photonics", Willey 2007 (segunda ed.)

Allan Billings. Prentice Hall 1993

Edt. Brian Culshaw & John Dakin. Artech House 1988

J.M. Cabrera, F.J. López y F. Agulló López. Addison-Wesley Iberoam. 1993

Mark Fox. Cambridge University Press. 2001

K. Thyagarajan & Ajoy Ghatak. Wiley Interscience 2007

F. Träger Edt. Springer. 2007

Recommendations

Subjects that continue the syllabus

Photonics Laboratory/O01M117V01204

Subjects that it is recommended to have taken before

Laser Physics/O01M117V01103
