Ultrafast photonics

Academic Year: (2019 / 2020) **Review date: 17/05/2017 18:11:40**

Department assigned to the subject:

Coordinating teacher: GARCIA SOUTO, JOSE ANTONIO

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Photonics Technologies I; Photonics Technologies II; Photonics Technologies III

OBJECTIVES

Basic skills...

+ Knowledge and understanding that provide a basis or opportunity for originality in developing and / or applying ideas, often in a research context.
+ That the students can apply their knowledge and ability to solve problems in new or unfamiliar in wider or multidisciplinary environments related to their field of study.
+ That the students can integrate their knowledge, as well as handle the complexity of making judgements from an incomplete or limited information, but which could include reflections about the social and ethic responsibilities that could be linked to the application of their judgements and knowledge.
+ That the students possess learning skills that allow them following their long-life learning in a self-conducted and self-sufficient way.

General skills ...

+ Ability to propose, design, implement and maintain a system with photonic components for a specific application

Specific Skills ...

+ Handling of tools aiming to design photonic devices and systems.
+ To be aware of the current trends in different applications of photonic technologies and learned experiences from real cases.
+ Capacity of selecting novel photonic components, technologies and subsystems.
+ Capacity of designing photonic devices, passive and active, and of evaluating its performance
+ Capacity of effectively searching information, as well of identifying the state of the art in a technological problem in the field of photonic devices and systems

LEARNING OUTCOMES:

Students should be able to do the following upon completion of this subject:

+ To describe the development techniques and applications of advanced lasers and their limitations and differences between commercial lasers, choosing the most suitable type of laser for a specific application.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Ultrafast lasers types, mode-locked lasers and development techniques.
2. Nonlinear optical properties of photonics materials for generating ultrashort pulses

3. Oscillator design and soliton generation.
4. Applications of ultrafast lasers in industry, optical communications, spectroscopy and sensing.

LEARNING ACTIVITIES AND METHODOLOGY

TRAINING ACTIVITIES:

theoretical and practical classes
Laboratory practices
tutorials
Team work
Individual student work

TEACHING METHODS:

+ Lecture class with support of audiovisual media, in which the main concepts of the subject are developed and the literature is provided to supplement student learning.
+ Critical reading recommended by the subject teacher texts: reports, manuals, scientific articles, either for subsequent class discussion, either to expand and consolidate the knowledge of the subject.
+ Practical cases resolution, problems, etc. set by the teacher in an individual or group way.
+ Exposure and discussion in class, with the supervision of the teacher of subjects related to the course, as well as of practical cases
+ Documents and reports in an individual or group way

ASSESSMENT SYSTEM

% end-of-term-examination/test:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

Ordinary call:

+ Individual or group working, and continuous assessment oral or written tests : 40 %
+ Final exam (individual): 60 %

Extraordinary call:

+ An extraordinary final exam will be made. The evaluation may be following the continuous evaluation procedure with the same weights as in the ordinary call or 100% of the final exam mark.

BASIC BIBLIOGRAPHY

- Agrawal, P. Nonlinear Fiber optics , 3rd Ed. Academic Press, 2001

- Boyd, R.W. Nonlinear optics, Elsevier, 2008

- Rullière, C. Femtosecond laser pulses: principles and experiments, 2nd Ed. New York, Springer, 2003