Lidar system and applications

Academic Year: (2019 / 2020) **Review date: 23/05/2017 11:06:01**

Department assigned to the subject:

Coordinating teacher: GARCIA CAMARA, BRAULIO

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 2

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 analyzing and designing photonic systems for applications in communications and sensing.
-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
Upon finishing he course, the students must be able to:

¿ From a capture of specifications, be able to identify the different parts necessary for obtaining the desired functionality (information transmission, optical propagation medium, receiver, information retrieval) and perform the specification of the different subsystems.
¿ To analyze, understand and solve a complex photonic problem from the origin to the end, from aspects such as conceptual planning, bibliographic search to oral and / or written communication of results, in accordance with scientific procedures and methods.
¿ To know the main concepts and tools needed to understand the different optical phenomena of application in sectors such as biomedicine, industry, communications, image, etc.
¿ From the specifications and requirements of the different blocks that make up a photonic system focused on a specific professional application or research activity, know the tools necessary for the development of the blocks, and plan such development and integration of all the blocks.
¿ To design, implement and characterize photonic systems from their components for applications in different productive sectors.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Basic pulsed lidar systems
2. Continuous lidar systems
3. 3D scanning systems
4. Doppler Lidars
5. Lidars for remote atmospheric sensing
6. Differential Absorption Lidar

LEARNING ACTIVITIES AND METHODOLOGY

Learning Activities
- Lectures
- Practical classes
- Theoretical and practical classes
- Laboratory practices
- Tutorials
- Team work
- Individual student work

Methodology

- Exhibitions in class with teacher support and audiovisual media, in which the main concepts of matter are developed and the literature is provided to supplement student learning.
- Critical reading of subject texts recommended by the teacher: newspaper articles, reports, manuals and / or academic papers, either for later discussion in class, either to expand and consolidate the knowledge of the subject.
- Resolution of practical cases, problems, etc. posed by the teacher individually or in groups.
- Exposure and discussion in class, under the moderation of the professor, of subjects related to the content of the subject, as well as practical cases.
- Preparation and defense of papers and reports individually or in groups.

ASSESSMENT SYSTEM

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

Ordinary call:
- final exam (individual) 40%
- Individual or group works, including written or oral during the course: 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

- C. Weitkamp Lidar: range-resolved optical remote sensing of the atmosphere, Springer Science & Business, 2006

- S. Donati Electro-optical instrumentation: sensing and measuring with lasers, Pearson Education, 2004

- T. Fukuchi, T. Shiina Industrial applications of laser remote sensing. , Bentham Science Publishers, 2012