Photonics Technologies III

Academic Year: (2022 / 2023) **Review date: 05-09-2022**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: SANCHEZ PENA, JOSE MANUEL

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

No prerequisites.

OBJECTIVES

Upon successful completion of this course students will be able to:
- Understand the working principle of photodetectors, amplifiers and signal conditioning circuits to select and use the most suitable ones in an application
- Know the noise sources in photonic systems in order to evaluate their performance
- Apply signal processing techniques to improve optical systems
- Understand and apply optical modulation and multiplexing techniques
- Analyze current optical communications systems
- Propose and design photonic systems based on discrete components for sensor applications

DESCRIPTION OF CONTENTS: PROGRAMME

This course together with the other two contained in the subject "Foundations of Photonic Engineering" (Photonic Technologies I and Photonic Technologies II) provides students the fundamental knowledge for the development of itineraries proposed in the Master. Contents proposed in this subject provide new tools and concepts associated with the operation, specification and design of photonic systems, including the selection and use of active and passive photonic devices available in the market and that can be incorporated in high added value photonic systems.

The program of the subject "Photonic Technologies III" is divided into 4 blocks:

I: Receivers in Photonic Systems
- Photodetectors. Working principle
- Amplifiers and conditioning circuits
- Noise in optical receivers
- Signal and image processing techniques

II: Optical Modulation and Multiplexing
- Modulation techniques. Modulation techniques for optical communications systems
- Multiplexing techniques (OTDM, WDM, OFDM, SDM...)

III:Current Optical Communications Systems Analysis
- Optical communications link components and performance
- Application examples

IV: Photonic Systems for Sensors Applications
- Sensors based on photonic components. Working principle
- Application examples

LEARNING ACTIVITIES AND METHODOLOGY

TRAINING ACTIVITIES:

- Lectures

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

TEACHING METHODS:

- 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.

- Preparation and defense of papers and reports individually or in groups.

ASSESSMENT SYSTEM

Ordinary call:
- Individual or group works, including written or oral during the course: 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 structure as in the ordinary call or 100% of the final exam mark.

In both calls a minimum grade of 3.5 / 10 is required to pass.

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

BASIC BIBLIOGRAPHY

- 1. Faculty of the subject Documentation of the subject, Faculty of the subject, 2019
- 2. B.E.A. Saleh, M.C Teich Fundamentals of photonics 2nd edition, Wiley Series in Applied Optics. John Wiley and Sons, 2007
- 3. S.O.Kasap Optoelectronics and Photonics: Principles and Practices, Pearson Education, 2013