60931 - Optical and microwave communications systems

Información del Plan Docente

Academic Year	2017/18
Subject	60931 - Optical and microwave communications systems
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	533 - Master's Degree in Telecommunications Engineering
ECTS	5.0
Year	1
Semester	Second semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as

M1 Lectures. Presentation of the main course contents combined with the active participation of students. This activity

will take place in the classroom. This methodology, supported by the the student's autonomous work (M14) is designed to provide the students with the necessary theoretical foundations for the course.

M8 Practice sessions. Sessions of problem-solving and practical cases proposed by the teacher, related to the lectures. It is expected that the students will present individually or in groups their results under the teacher's supervision. This activity will take place in the classroom. It may be required the use of laptops/tablets by the students.

M3 Laboratory sessions. 5 sessions of 2 hours each will be held in the L.3.02 Laboratory (Optics Laboratory) of the Ada Byron Building. There, training series in small groups will be held to consolidate some of the concepts developed throughout the classes. Students must complete questionnaires with the obtained results in experiments and a justified discussion of those.

M10 Tutorials. Teacher's office hours to review and discuss the materials and topics presented in both lectures and practice sessions.

M11 Assessment. A set of reports and assignments used in the evaluation of the student. The details are in the "Assessment" section.

5.2.Learning tasks

The course includes the following learning tasks:

- **Lectures** (30 hours). 2 weekly hours scheduled according to the calendar and structured as shown in the syllabus.
- **Practice Classes** (10 hours). 1 weekly hour for problem-solving, orientation, critical sessions and group presentations. Sometimes it will follow some aspects seen in lectures. The orientation sessions aim to help students solve doubts and questions that have arisen during the preparation of the theoretical part.
- **Laboratory sessions** (8 hours). 4 sessions of two hours each will be held in the laboratory 3.02 (optics laboratory located on the third floor of the Ada Byron building).
- **Assignments** (24 hours). Throughout the semester, students will do practical assignments in pairs.
- **Individual tutorials.** Students may ask for individual tutorials related to practice or theory sessions. The appointment should be agreed with the corresponding teacher.

5.3.Syllabus

The course will address the following topics:

Section 1. Introduction to optical communications systems.

- Analysis and design of conventional optical systems
- Limitations on transmission bit rate and distance: key devices

Section 2. The wavelength degree of freedom: DWDM systems.

- Systems presenting wavelength division multiplexing
- Key devices in DWDM systems
- Limitations on DWDM systems: spectrum and transmission bit rate
- Insertion and drop of fixed channels: OADMs

Section 3. New generation systems based on advanced modulation schemes.

- Usage phase: devices
- Coherent systems. Limitations.
- Using Polarization

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- Spectrum Optimization Techniques

Section 4. Exploiting the resources: all optical networks.

- Flexibility in optical networks: ROADMs and their role in the design of optical networks
- ROADMs types and manufacturing technologies
- Channel, wavelength & fiber switching
- Flexible optical networks and their management layer

Section 5. Other optical systems for new generation networks.

- Radio over fiber systems
- Optical access networks

5.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the EINA website.

5.5.Bibliography and recommended resources

- Agrawal, Govind P.. Lightwave technology : telecommunication systems / Govind P. Agrawal Hoboken : Wiley-Interscience, cop. 2005
- Kartalopoulos, Stamatios V.. DWDM : networks, devices and technology / Stamatios V. Kartalopoulos Hoboken, New Jersey : Wiley Interscience, cop. 2003
- Agrawal, Govind P.. Applications of nonlinear fiber optics [Recurso electrónico] / Govind P. Agrawal . 2nd ed. Amsterdam ; Boston : Elsevier ; Burlington, MA : Academic Press, cop. 2008
- Saleh, Bahaa E. A.. Fundamentals of photonics / Bahaa E. A. Saleh, Malvin Carl Teich . - 2nd ed. Hoboken : Wiley and Sons, cop. 2007
- Bibliography based on literature that will be offered through the Moodle platform