

60961 - Optical and microwave communications systems

Syllabus Information

Academic year: 2023/24

Subject: 60961 - Optical and microwave communications systems

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 623 - Master's Degree in Telecommunications Engineering

ECTS: 6.0

Year: 1

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

This subject aims to train students to acquire the necessary skills for the exercise of the profession of telecommunications engineer in the field of optical and high frequency transmission systems, with special interest in the latest trends in optical networks.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), so that the acquisition of the learning results of the subject will contribute to some extent to the achievement of Objectives 9.5, 9.c, 9.1 of Goal 9 and 8.2 of Goal 8.

2. Learning results

- To know how to analyse and design communications systems through fibre optic networks using the technologies defined by the corresponding standards.
- To know the techniques to analyse and evaluate the elements used in the physical layer of optical networks.
- To know the characterization techniques of high frequency modulation, transmission and reception devices.
- To know how to evaluate the limiting phenomena of transmission capacity in optical networks, as well as the usual techniques to mitigate such effects and increase network performance.
- To understand the technologies on which next-generation optical communications systems are based
- To know monolithic and hybrid integrated circuits for both integrated optics (PICs) and microwave (MMICs).

3. Syllabus

1. Introduction to optical communications systems
 2. Transmission rate and distance limitations: key devices
 3. The degree of freedom of the wavelength: DWDM systems.
 4. New generation systems based on advanced modulations.
 5. Exploiting resources: all-optical networking
- Other new generation optical systems

4. Academic activities

Theoretical classes: 3 hours of theoretical classes will be given weekly, according to the class schedule and structured in the topics related to the subject program (43 hours).

Problem classes: Dedicated to problem solving, consulting, critical sessions and joint expositions (9 hours).

Laboratory practices: 4 laboratory practices of two hours each will be developed (8 hours)

5. Assessment system

The subject will be evaluated as follows:

1. **Partial theory tests (topics 1 to 3) (35%, minimum of 4 out of 10):** Gradual evaluation of subject matter consisting of several partial tests. It is intended to ensure that the student has the basic knowledge to be able to undertake the resolution of more complex problems.
2. **Laboratory practices (15%, minimum of 5 out of 10):** they will be evaluated taking into account the attitude of the students and some questionnaires with the results obtained in their experiments in the laboratory and the reasoned discussion of the same.

3. **Problems or deliverable work (10%):** Problems and practical issues that are proposed and presented in the classroom, but can be developed or performed outside the classroom by students individually or in groups.

Students who have not obtained the minimum grade in the partial tests or laboratory practices or have not submitted the proposed work must take a test related to them in the global evaluation test.

4. **Exam on the second part (topics 4 to 6) (40%, minimum of 4 out of 10):** final written test to assess the knowledge acquired by the student and, in particular, their ability to apply it to solve practical problems and questions.

The student will have a global test in each one of the calls for exams established throughout the academic year. Dates and times will be determined by the School.