

Academic Year of Degree: 2025/26

23980 - Optical Networks

Teaching Guide Information

Academic Course: 2025/26

Academic Center: 337 - Engineering School

Study: 3379 - Bachelor's degree in Telecommunications Network Engineering

Subject: 23980 - Optical Networks

Credits: 5.0

Course: 4

Teaching languages:

Theory: Group 1: English

Practice: Group 101: English

Seminar: Group 101: English

Teachers: Boris Bellalta Jimenez, Carlos Bock Montero

Teaching Period: First term

Presentation

The objective of the Optical Networks subject is for the student to know in depth the technologies associated with optical communications, as well as the architecture and operation of the transmission systems that use this medium. It is also intended that the student learn to plan long-distance, transport and access networks.

The course is structured in three clearly differentiated theoretical parts:

1. Fundamentals of optical communications: This first part of the course covers the basic concepts of optical communications. It includes a tour of the devices commonly used to transmit in this medium, such as lasers, photodetectors, and optical fibers, as well as the most common transmission systems. The aim is for the student to understand the general operation of the most commonly used optical systems.
2. Telecommunications network architectures and optical technologies: The second block of the course describes the different types of telecommunications networks and the optical communications technologies used in each of them. This includes everything from submarine cable networks, which connect continents, to access networks that reach end users. The transport networks that facilitate the transit of large volumes of data between cities and regions are also examined.
3. Regulatory, planning and business aspects: The third block of the course deals with the regulatory, planning and business issues that affect optical networks. Here we discuss the regulations that regulate the use of optical networks, strategies for efficient network planning, and business models that can be adopted by companies operating in this sector.

Overall, the course provides a comprehensive view of optical networks, combining technical knowledge with practical and commercial aspects, in order to prepare students to face the professional challenges in this field.

Associated skills | General learning outcomes

CE10. Describing, programming, validating and optimizing communication protocols and interfaces in the different levels of a networks hierarchy.

CE11. Developing and using analysis, simulation and experimentation methods in the design, assessment and optimization of telecommunication networks and systems.

CE13. Managing and administrating networks and telecommunication services

Learning outcomes | Specific learning outcomes

RA.CE10.5 Recognizing the basic principles of the functioning of the current communications networks and details of the functioning of the family of Internet protocols TCP/IP.

RA.CE11.1 Analyzing and designing networks applying methodology of modelling and simulation.

RA.CE11.3 Recognizing the devices, techniques and systems which are displayed in optical networks.

RA.CE13.5 Elaborating projects in the field of telecommunication engineering which have as an aim, according to the acquired knowledge, the conception and development or exploiting of telecommunication networks, services and applications.

Contents

Emitters, fibers and optical receivers

WDM and advanced components

Optical Networks

Regulation and planning

Sustainable Development Goals

9 - Industry, Innovation and Infrastructure

Evaluation and grading system

- 40% Final exam (>4)
- 20% Mid-course exam
- 30% Deployment project
- 10% Project presentation

The project is mandatory. Not to pass the project means not passing the course.

Minimum mark on the Final exam needs to be 4 to it counts for the global mark calculation.