Universidad Zaragoza

Year : 2019/20

30358 - Optical Communications Laboratory

Syllabus Information

Academic Year: 2019/20
Subject: 30358 - Optical Communications Laboratory
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 438 - Bachelor's Degree in Telecomunications Technology and Services Engineering
ECTS: 6.0
Year: 4
Semester: First semester
Subject Type: Optional
Module: ---

1.General information

1.1.Aims of the course

The aim of this course is to provide the student with the technical knowledge and skills required to manipulate and characterize the elements of fiber-based communication links.

1.2.Context and importance of this course in the degree

This course is centered on the practical aspects of fiber-guided optical communications. It is an optative subject for the students of the specific technology: Telecommunication systems of the Bachelor's Degree in Telecommunications Technology and Services Engineering.

1.3.Recommendations to take this course

It is advisable to know the basics of fiber-guided communication systems such as provided by Optical Transmission Devices and Systems (30335).

It is required to attend to all programmed activities because this course is based mainly on Laboratory work.

2.Learning goals

2.1.Competences

After successfully completing this course, the student will have acquired the following skills:

- To combine general and specific knowledge to make innovative and competitive proposals (C3)
- To solve problems and make decisions based on creativity and critical reasoning (C4)
- To transmit knowledge, abilities and skills in Spanish (C5)
- To have the ability to apply techniques, skills and tools needed to engineering practice (C6)
- To analyze and evaluate the social and environmental impact of technical proposals acting from the vantage point of ethics, professional responsibility, and social commitment (C6)
- To work in interdisciplinary and multilingual environments (C8)
- To manage information, technical specifications and laws needed to engineering activities (C9)
- To develop strategies of continuous and autonomous learning (C10)
- To apply information and communication technologies to the engineering practice (C11)
- To analyze the specifications of guided and un-guided communication system components (CST3)
- To be able to select devices, sub-systems and systems for radio communications (CST4)
- To be able to select antennas, devices for guided and un-guided transmission systems (CST5)

2.2.Learning goals

At the end of the course, the student will be able:

- To manipulate optical fibers including fiber-end preparation and light injection and to use different types of connectors

- To use and characterize active devices such as optical transmitters, optical amplifiers and optical receivers
- To use measurement equipment specific for optical fibers such as OTDR (Optical Time Domain Reflectometer), OSA (Optical Spectrum Analyzer), etc.
- To manipulate and characterize optical components specific for communications such as wavelength multiplexers, couplers, etc.
- To understand and implement characterization standards for optical fibers and devices
- To design an experiment with a given objective and to draw conclusions from its processed results
- To use simulation platforms specific for the design of optical links

2.3.Importance of learning goals

This course is focused on techniques and devices for communications using the optical range of the electromagnetic spectrum. Optical fibers have been the base of the physical layer of trunk continental and submarine networks and nowadays, optical fiber communications are closer to the user as more and more FFTH networks are being deployed. Thus, to engineer communication systems it is necessary to know how to design, evaluate, control and manage optical networks. In addition, the technologies to increase bandwidth and flexibility are leaded by all-optic techniques.

3.Assessment (1st and 2nd call)

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

The grading of this course is regulated by application of Article 9.4 of the Normative of Grading Assessment and can be achieved by obtaining a minimum of 5 in the weighted average of the following learning activities:

- Laboratory assignments (50%). The quality of the activity of the students during the lab sessions will be evaluated, as well as the laboratory reports for all each assignment.
- Oral presentation (25%). Each student will make a presentation of one of the laboratory assignments, explaining the methods and experiments, describing the results and justifying the conclusions that will be discussed by all the students.
- Practical exam: problem-solving questions (25%).

Students that have not obtained the minimum average of 5 can be graded in a global assessment exam whose dates are stated by are stated by "Escuela de Ingeniería y Arquitectura " (https://eina.unizar.es/).

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. It is based on participation and the active role of the student favors the development of communication and decision-making skills. A wide range of teaching and learning tasks are implemented, such as lectures, guided assignments, laboratory sessions, autonomous work, and tutorials.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

4.2.Learning tasks

Lectures: the teacher will explain the theoretical contents of the course and the procedures used in the Laboratory. This information can be found at the repository available via Moodle. The students will also present and discuss the results obtained in the laboratory sessions. Each presentation will be followed by a discussion with the rest of the students and the teacher to promote peer-assessment of their work.

Laboratory sessions: sessions will take place twice a week and last 2 hours each. The presence of the student is mandatory in this task. Students will work together in groups in the laboratory actively designing and performing experiments using different set-ups and measurement devices.

Guided assignments: students will be asked to elaborate essays and oral presentations discussing the results obtained in the laboratory (including bibliographical research, analysis, summary, scientific rigor, coherence of expression and citations). They will be submitted when specified by the teachers. Autonomous work: students are expected to study theory, solve problems, prepare lab sessions, elaborate essays and oral presentations and take exams.

Tutorials: the professor's office hours will be posted on Moodle and the degree website to assist students with questions and doubts. It is beneficial for the student to come with clear and specific questions.

4.3.Syllabus

The course will address the following topics:

Topic 1. Optical fibers. Manipulation and characterization of different types of optical fibers and cables

Topic 2. Programing in optical networks simulation software

Topic 3. Handling and characterization of active devices: optical sources, photodetectors, and optical amplifiers

Topic 4.Passive devices use and characterization: Multiplexers, couplers, etc.

Topic 5. Experimental analysis of WDM systems

4.4.Course planning and calendar

For further details concerning the timetable, classroom and further information regarding this course, please refer to the "Escuela de Ingeniería y Arquitectura " website (https://eina.unizar.es/)

4.5.Bibliography and recommended resources

Using the digital support available at the University of Zaragoza, the students of the course will have access to all documentation provided by the teachers.

http://biblos.unizar.es/br/br_citas.php?codigo=30358&year=2019