30317 - Propagation and Means of Transfer

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	438 - Bachelor's Degree in Telecomunications Technology and Services Engineering
ECTS	9.0
Year	2
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

Methodology:

1. Lectures (54 hours) laying the theoretical foundations of the course. This activity will be classroom-based and will be centered on material previously delivered to the student (or available online).
2. Problems and case studies (20 hours). Problems and cases appointed by the teacher, to be resolved by the

students or the teacher himself, based on the content of the lectures. This activity will be classroom-based.
3. Laboratory (16 hours). 8 laboratory asignments of 2 hours each, to be performed in laboratories L.3.06 (Laboratorio de Alta Frecuencia) and L.3.0.2 (Laboratorio de Óptica) at the Ada Byron building. Small groups of students will carry simulations and experimental measurements using specilfical equipment related to the propagation of guided and radiating waves, in order to build on the knowledge aquired during the lectures. This activity will require presence at the laboratory.
4. Group assignment (16 hours). Each group, under the supervision of a teacher, will be asigned a case study related to Common Telecommunications Infrastructures (CTI) and their current standards and regulations. The assignment also includes assistence to seminars on the subject, possibly with the participation of guest speakers.
5. Personal attention through academic tutoring.

5.2.Learning tasks

Classroom-based learning:

Lectures and cases according to the program developed on section 5.3

Laboratory:

1. Transmission lines. Signal propagation on transitory and senoidal permanent regimes. Time domain reflectometry (Laboratory L3.06, 3rd floor, Ada Byron).
2. The Smith chart. Impedance matching (Laboratory L3.06, 3rd floor, Ada Byron).
3. Theoretical and experimental study of waveguides (Laboratory L3.06, 3rd floor, Ada Byron).
4. Introduction to optical fibers. (Laboratory L3.02, 3rd floor, Ada Byron).
5. Colective antenna installation according to CTI regulations. (Laboratory L3.06, 3rd floor, Ada Byron).
6. Antenna measurements: radiation diagrm and polarization (Laboratory L3.06, 3rd floor, Ada Byron).
7. Propagation measurements: free space transmission, difraction and space wave (Laboratory L3.06, 3rd floor, Ada Byron).
8. Design and electromagnetic simulation an antenna array (Laboratory L3.06, 3rd floor, Ada Byron).

Seminars

- Introduction to Common Telecommunications Infrastructures.
- Learning to design Common Telecommunications Infrastructures according to current standards.

5.3.Syllabus

Unit 0. Introduction to Telecommunication system s

Unit 1. Transmission lines

1.1 Propagation on transmission lines

1.2 Transients on transmission lines

1.3 Transmission line circuits. Impedance matching

1.4 S-parameters

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Unit 2. Waveguides. Optical fibers and optical transceptors

2.1 Propagation in waveguides

2.2 Optical fibers

Unit 3. Fundamentals of acoustical transmisssion and reception

3.1 Radiation of acoustic waves and acoustic components

3.2 Electroacustic transductors

Unit 4. Basic radio transmit and receive elements

4.1 Introduction.

4.2 Transmission parameters of antennas

4.3 Reception parameters of antennas

4.4 Transmit-receive parameters of antennas

4.5 Antenna noise temperature

Unit 5. Analysis of radiating structures and antenna arrays

5.1 Introduction to radiation

5.2 Basic antennas

5.3 Introduction to the analysis of linear antena arrays

5.4 Linear array directivity

Unit 6. Radio wave propagation

6.1 Free space and near-earth propagation

6.2 Earth related effects

6.3 Troposphere related effects

6.4 Ionosfere related effects

5.4.Course planning and calendar

Distribution of activities:

- Lectures and problems: six hours a week during the semester
- 8 laboratory sessions of 2 hours each, in reduced groups
- 2 seminars of 2 hours each dedicated to an introduction to Common Telecommunications Infrastructures (CTI)

The schedule for lecture and laboratory sessions and the evaluation dates will be provided by the university before the beginning of the semester.

5.5.Bibliography and recommended resources

Basic bibliography:

- CHENG, D.K., Field and wave electromagnetics, 2 nd ed., Addison-Wesley, 1989.
- CARDAMA A, y otros, Antenas, Edicions UPC, 2ª Edición, Nov 2002.

Advanced bibliography:

- COLLIN, R.E.: Foundations for microwave engineering, Willey IEEE Press, December 2000.
- KEISER, G.: Optical Fiber Communicatons, 3 rd ed., McGraw-Hill, 1999.
- PUEO, B., ROMÁ, M., Electroacústica: altavoces y micrófonos, Madrid : Pearson Educación, D.L. 2003
- BALANIS, C. A. Antenna Theory Analysis and Design, John Wiley and Sons, 3 rd edition.
- HERNANDO, J. M Transmisión por radio, 6ª ed. Madrid : Editorial Universitaria Ramón Areces, 2008

The students will also have access to a collection of lecture notes and problems, prepared by the teachers, which will cover all the contents of this course.