30318 - Digital Communications

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	438 - Bachelor's Degree in Telecomunications Technology and Services Engineering
ECTS	6.0
Course	2
Period	Second semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

The learning process is based on the following methodology:

M1. Lectures.

M4: Miniprojects.

M8: Practical classes.

M9: Laboratory work.

M10: Tutoring.

M11: Evaluation.

5.2.Learning activities

A1. Lectures (40 hours). The teacher presents the theory and students participate actively. This activity will take place in the classroom. This methodology, is designed to provide students with the theoretical foundations of the subject and requires individual home work from the student (M14).

A2: Practical classes (10 hours). The students solve problems to consolidate the theoretical concepts from the lectures. This activity will be conducted at the classroom.

A3. Lab work (10 hours). There will be 5 sessions of 2 hours in the Signals and Systems Laboratory L2.02 (Ada Byron building). The students are provided with a series of problems to solve, which include the main blocks of a digital communication system, to consolidate the theoretical concepts from the lectures. This activity will be conducted at the Laboratory.

A4: Miniprojects (20 hours). The students develop an implementation of the theory concepts of the course using a simulation environment provided by the teacher. Then they write a report and make an oral presentation

A5: Tutoring. The teacher answers questions to the students in the office with the aim of reviewing and discussing the materials and topics presented both theoretical and practical.

A6: Evaluation. The evaluation is done using the lab reports, project work and written tests described in the evaluation section.

5.3.Program

The program of the course is the following:

1. Basic information theory and source coding

1.1. Information measure, Entropy and channel capacity.

1.2. Discrete source coding

1.3. Analog source coding

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Linear and logarithmic coding

Differential coding

2. Channel coding

2.1. Basic concepts

Structured redundancy

Coding gain

2.2. Block codes

Generator matrix

Decoding process

Cyclic codes

Detecting and correcting capacity

Hard and soft decision

2.3. Convolutional codes

Basic principles and properties

Maximum likelihood decoding (Viterbi's algorithm)

Interleaving and concatenated codes

3. Synchronization in digital communication systems

3.1. Carrier synchronization

3.2. Symbol synchronization

3.3. Frame synchronization

4. Channel equalization

4.1. Equalization basic concepts

4.2. Linear equalization.

Zero forcing

Minimum mean square error

5. Multipulse modulations

5.1. Multicarrier modulation

5.2. Spread spectrum modulations

5.3. Multiple access systems

5.4.Planning and scheduling

The timetable of the course, contact hours, and laboratory sessions will be defined by the center in the academic calendar of the corresponding course.

5.5.Bibliography and recomended resources

1. Sklar, Bernard. Digital communications : fundamentals and applications / Bernard Sklar . - 2 nd ed., repr. with corr. Upper Saddle River, New Jersey : Prentice-Hall PTR, 2001

2. Proakis, John G.. Digital Communications / John G. Proakis . - 4th ed., International ed. Boston [etc.] : McGraw-Hill, 2001

3. Proakis, John G.. Communication systems engineering / John G. Proakis, Masoud Salehi Englewood Cliffs, New Jersey : Prentice Hall, c.op. 1994

4. Haykin, Simon Saher. Digital communication / Simon Haykin S. New York : John Wiley & Sons, 1988