

30318 - Digital Communications

Información del Plan Docente

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| Academic Year | 2018/19 |
| Subject | 30318 - Digital Communications |
| Faculty / School | 110 - Escuela de Ingeniería y Arquitectura |
| Degree | 438 - Bachelor's Degree in Telecommunications Technology and Services Engineering |
| ECTS | 6.0 |
| Year | 2 |
| Semester | Half-yearly |
| Subject Type | Compulsory |
| Module | --- |

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

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

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The learning process is based on the following methodology:

M1. Lectures.

M4: Miniprojects.

M8: Practical classes.

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M9: Laboratory work.

M10: Tutoring.

M11: Assesment

4.2.Learning tasks

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.

4.3.Syllabus

The program of the course is the following:

1. Synchronization in digital communication systems

1.1. Carrier synchronization

1.2. Symbol synchronization

1.3. Frame synchronization

2. Basic information theory and source coding

2.1. Information measure, Entropy and channel capacity.

2.2. Discrete source coding

2.3. Analog source coding

Linear and logarithmic coding

Differential coding

3. Channel coding

3.1. Basic concepts

Structured redundancy

Coding gain

3.2. Block codes

Generator matrix

Decoding process

Cyclic codes

Detecting and correcting capacity

Hard and soft decision

3.3. Convolutional codes

Basic principles and properties

Maximum likelihood decoding (Viterbi's algorithm)

Interleaving and concatenated codes

4. Channel equalization

4.1. Equalization basic concepts

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4.2. Linear equalization.

Zero forcing

Minimum mean square error (MMSE)

5. Multipulse and multicarrier modulations

5.1. Spread spectrum modulations

Direct Sequence Systems (DS)

Frequency Hopping Systema (FH)

5.2. Multiple access systems

4.4.Course planning and calendar

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

4.5.Bibliography and recommended resources

1. Sklar, Bernard. Digital communications : fundamentals and applications / Bernard Sklar . - 2nd 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