Communication´s Equipments

Academic Year: (2023 / 2024) **Review date: 26/04/2019 17:14:30**

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: MOLINA BULLA, HAROLD YESID

Type: Electives ECTS Credits : 3.0

Year : Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Electronic Systems (3rd Course, 1st Term)
Digital Communications

OBJECTIVES

The course aims to end general students have knowledge of the elements of a communication system (transmitter and receiver), as defined by their job specifications and design thereof.

This knowledge involves the ability to design, analysis and integration of the various components involved in these devices.

The students acquire knowledge on a global basis will be:

* Specification of the models of noise and noise in a communications system.
* Specification and integration of component modules of the communications system.
* Design of module communications system.
* Selection of components for implementing the final design.

The general skills that will be sought during the course are:

* Vision joint general model (PO a, i, k).
* Ability to apply practical knowledge acquired in previous courses.
* Ability to design both the integration of components such as design of the same (PO c, e, i, j).
* Ability to integrate external developments (PO d, e).
* Ability to carry out experiments for the characterization of components and general design (PO b, c, d, e).
* Ability to make design according to the specifications of a specific problem or a particular social problem (PO a, b, c, e, k).

DESCRIPTION OF CONTENTS: PROGRAMME

1. Architecture of transmitters and receivers: We consider the design of transmitters and receivers, basic components and their integration. Be modeled internal noise sources and interfering signals.

2. Linear Devices: RF Filtering and Amplifiers: We examine the selection and design of basic filters, as a practical application of the theory of light filters in previous courses. RF amplifiers will be studied common in communications systems (small signal and power), and their integration into communications equipment. Applications will be specific to different types of general amplifiers studied in other subjects.

4. Non-Linear devices: Mixers and Oscilators: We teach the design, implementation and characterization of signal mixers and Oscilators, like the various technologies used for this purpose.

6. And PLL Frequency Synthesizers: We show in detail the design and use of devices such as stabilizers PLL oscillators and frequency synthesizers.

7. Modulators and Demodulators: We teach the design and implementation of signal modulators and demodulators, technology and characterization of them. It is used all the knowledge acquired along the course, being the integration of components previously studied.

8. Digital Signal Processing (DSP) in modulator and demodulator. There will be an introduction to using DSP microprocessors aimed at the implementation of communications systems and signal processing from a digital perspective.

LEARNING ACTIVITIES AND METHODOLOGY

Suggests three types of training activities: theory classes, laboratory issues and practices.

ECTS credits included in all cases the share of personal and team work by the student.

CLASS OF THEORY (1 credits)
The theoretical lectures will be on board with the use of slides or other media to illustrate certain concepts. In these classes, will complement the explanations of theoretical concepts with exercises.

Through these sessions the student will acquire the basic contents of the subject. Importantly, these classes will require initiative and personal and group work by students (there are concepts that should consider personally from some indications, particular cases will be developed, etc..) (PO a, e, i)

PROBLEMS (.5 ECTS)
For the class of problems, students will have the particulars relating advance. In such classes, students will be encouraged to organize themselves into small groups so as to participate actively in solving problems.

Problem solving by the student will serve to assimilate the concepts presented in class theory in a more applied context and assess their knowledge.

The kinds of problems include the pooling of individual solutions and joint correction, which should serve to consolidate knowledge and develop the ability to analyze and communicate relevant information to solve problems. Besides sharing promote the exchange of critical opinions both between teacher and students and between students. (PO a, c, d, e)

PRACTICES (1.5 ECTS)
Consist of the performance by students (organized into groups) of transmitters and receivers for simple communications (or portions thereof). These systems include much of the theoretical content learned during the course, thus allowing the consolidation by the students. In addition, also make use of DSP (Digital Signal Processors) for the conduct of transmitters / receivers. (PO a, b, c, d, e, k)

Practice 1: Balanced Modulator
- AM Modulator
- DBL Modulator
- Frequency Doubler Circuit

Practice 2: PLL Circuits
- Communication Device Characterization
- Coherent AM demodulator

Lab 3: Introduction to Digital Communications DSP
- Basic programming of DSPs
- Programming and Debugging Tools
- Generation of carriers
- FIR Filtering
- Nonlinear functions
- Sampling

Lab 4: Modulator/Demodulator ASK based on DSP Programming
- Develop of an ASK Modulator/Demodulator based on the DSP Tools learned in the previous practical work.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

Weighted sum of laboratory practice and final test set.

BASIC BIBLIOGRAPHY

- Krauss, H.L.; Bostina, Ch.W.; Raab, F.H. Solid state radio engineering, John Wiley & Sons, 1980.

- Smith, K. Modern communications circuits, McGraw-Hill, 1986.

ADDITIONAL BIBLIOGRAPHY

- Gardner, F.M. Phaselock Techniques., John Wiley & Sons, 1979..

- Kenneth, K. Clarke and Donald T. Hess Communication Circuits, Addison-Wesley, 1971.

- Rohde, U.L.; Bucher, T.N. Communication receivers: principles and design, McGraw-Hill, 1988.

- Schoenberck, R.J. Electronic Communications. Modulation and Transmission, Prentice-Hall, 1992.

- Van Der Puije, P.D. Telecomunication circuit design, John Wiley & Sons, 1992.

- Young, Paul H. Electronic Communication Techniques, Prentice Hall, 1994.