



Course guide

320107 - CAD - Analogue and Digital Communications

Last modified: 19/04/2023

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 739 - TSC - Department of Signal Theory and Communications.

Degree: BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Josep Sala Alvarez

Others: Josep Sala Alvarez

PRIOR SKILLS

Probability and Stochastic Processes
Signals and Systems

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CE09-ESAUD. Ability to analyze and specify the fundamental parameters of a communications system. (Common module for the telecommunications branch)

CE10-ESAUD. Ability to evaluate the advantages and disadvantages of different technological alternatives for the deployment or implementation of communications systems, from the point of view of signal space, disturbances and noise, and analog and digital modulation systems. (Common module for the telecommunications branch)

TEACHING METHODOLOGY

Theory class.
Laboratory class.

LEARNING OBJECTIVES OF THE SUBJECT

Introduce the basic concepts for analysis and design of the physical layer in analogue and digital communication systems. Familiarise students with probabilistic models for signals in a communications chain and develop students' abilities to apply these models to resolving practical problems. Use the MATLAB software to develop simple models of the physical layer in communication systems using pseudo-random signals.

STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	30.00
Self study	90,0	60.00
Hours small group	15,0	10.00

Total learning time: 150 h



CONTENTS

TOPIC 1: Digital Baseband communication systems

Description:

- Introduction: the communication chain
- Random Variables and Random signals in communication systems
- Digital Baseband Communication Systems
- Matched filter
- Detection and Error Probability

Full-or-part-time: 92h 20m

Theory classes: 24h

Laboratory classes: 10h

Self study : 58h 20m

TOPIC 2: Digital Pass-band communication systems

Description:

- Pass-band communication systems and low-pass equivalents
- Quadrature modulator and demodulator
- Power density spectrum in transmission
- Pass-band noise: power density spectra in the receiving chain
- Digital Pass-band Communication Systems
- Matched Filter
- Detection and Error Probability

Full-or-part-time: 57h 40m

Theory classes: 21h

Laboratory classes: 5h

Self study : 31h 40m

GRADING SYSTEM

Mid-semester exam (40 %)

Final Exam (50 %)

Practical exam (10%)

Reguidance due to unsatisfactory results:

- the computation of the final grade will be carried out for all students with the following formula:

$$0.1*NOTA_LAB + \text{MAX}(0.9*NOTA_EX_FINAL, 0.4*NOTA_EX_MIG_QUAD+0.5*NOTA_EX_FINAL)$$

(the final exam includes all themes). The "max" operation between the weighted grades and the grade of the final exam allows students with low grades in their md-term exam to have a re-evaluation opportunity.

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.

If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

EXAMINATION RULES.

It is only allowed to use a ballpen and blank paper sheets during the exam.