Advanced techniques in signal processing and communications

Academic Year: (2019 / 2020) **Review date: 18-10-2019**

Department assigned to the subject: Department of Signal and Communications Theory

Coordinating teacher: VAZQUEZ LOPEZ, MANUEL ALBERTO

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 2

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

The student must adquire the following competences:
- Knowledge to apply information theory methods, adaptive modulation, and channel coding, as well as digital signal processing advanced techniques applied to communication systems.
- Knowledge to apply analytic and algorithmic tools to deal with estimation adn classification problems and, in general, with information processing problems.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Communications: advanced receivers and modulation techniques
2. Introduction to Information Theory
3. Channel coding
4. Distributed signal processing
5. Dynamic models

LEARNING ACTIVITIES AND METHODOLOGY

Three teaching activities are proposed: Theoretical classes, exercise classes and laboratory exercises.

THEORETICAL CLASS AND EXAMPLES
The theoretical class will be given in the blackboard, with slides or by any other means to illustrate the concepts learnt. In these classes the explanation will be completed with examples. In these sessions the student will acquire the basic concepts of the course. It is important to highlight that these classes require the initiative and the personal and group involvement of the students (there will be concepts that the student himself should develop).

CLASS EXERCISES
Before the exercise class, the student will have available the exercise formulation. The student should solve the exercises proposed in order to assimilate the concepts obtained in the theoretical class in a more complex environment and to self-evaluate his knowledge.
In the exercise class one student will have to present the exercise proposed solving and the rest of students should give feedback on this particular problem solving. This will encourage the opinion exchange between students and the professor and among students.

LABORATORY EXERCISES
Basic concepts learnt during the course are applied in the laboratory and by means of simulation. The student should participate actively the exercise implementation; the level of the student involvement in this work grows from the first exercise to the last one where the student will be encouraged to propose and solve the problem.

ASSESSMENT SYSTEM

The continous assesment will determine 100% of the total course grade, and will be evaluated along the academic year trough homework, class exercises, technical reports writing, and laboratory exercises.

% end-of-term-examination:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

BASIC BIBLIOGRAPHY

- Artés, A., Pérez González, F., Cid, J., López, R., Mosquera, C., Pérez Cruz, F. Comunicaciones digitales, Peason.

- Cover, T.M., Thomas, J.A. Elements of Information Theory, Wiley-Interscience.
- Theodoridis, S Machine Learning - Learning From Data, Elsevier, 2015

ADDITIONAL BIBLIOGRAPHY

- Loeliger, H.A. An Introduction to Factor Graphs, Signal Processing Magazine, Jan 2004, IEEE.
- null Communications Magazine, IEEE.
- null Communications of the ACM, ACM.
- null Proceedings of the IEEE, IEEE.
- null Signal Processing Magazine, IEEE.