Introduction to Statistical Signal Processing

Academic Year: (2023 / 2024) **Review date: 15-12-2023**

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: RAMIREZ GARCIA, DAVID

Type: Additional training ECTS Credits : 2.0

Year : 0 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

The student should have basic knowledge of
- probability theory and statistics
- linear algebra.

OBJECTIVES

The main objective of this course is that the student acquires the basic knowledge/tools to be able to complete Statistical Signal Processing

DESCRIPTION OF CONTENTS: PROGRAMME

Probability theory: introduction, random variables, probability distribution and density functions, mathematical expectation and moments.
Stochastic processes: introduction, first- and second-order statistics, stationarity and power spectral density
Linear algebra: introduction, matrix algebra and matrix decompositions

LEARNING ACTIVITIES AND METHODOLOGY

LEARNING ACTIVITIES

AF3 Theoretical practical classes
AF4 Laboratory practices
AF5 Tutorials
AF6 Team work
AF7 Student individual work
AF8 Partial and final exams

METHODOLOGY
MD1: Class lectures by the professor with the support of computer and audiovisual media, in which the main concepts of the course are developed and complemented with bibliography.
MD2: Critical reading of texts recommended by the professor of the course.
MD3: Resolution of practical cases, problems, etc. .... posed by the teacher individually or in groups.
MD4: Presentation and discussion in class, under the moderation of the professor, of topics related to the content of the course, as well as case studies.
MD5: Elaboration of works and reports individually or in groups.

CONSULTATION HOURS

The students will be able to consult with the instructor during 2 or 3 hours per week

ASSESSMENT SYSTEM

SE1 Participation in class
SE2 Individual or team works made during the course (including mid-term exams)
SE3 Final exam

Evaluation systems (%)	Minimum weighting (%)	Maximum Weighting (%)
SE1	0	0

SE2	100	100
SE3	0	0

The extraordinary evaluation (june call) will be carried out with a final exam (SE3) that weights 100% of the grade.

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

BASIC BIBLIOGRAPHY

- A. Papoulis and S. Pillai Probability, Random Variables, and Stochastic Processes , McGraw-Hill, 2002
- D. Ramírez, I. Santamaría, and L. Scharf Coherence: In Signal Processing and Machine Learning, Springer, 2023