

Academic Year: (2024 / 2025)

Review date: 24-04-2024

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: RAMIREZ GARCIA, DAVID

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

STUDENTS ARE EXPECTED TO HAVE COMPLETED:

Introduction to Statistical Signal Processing (or similar)

OBJECTIVES

The main objective of this course is that the student is able to extract relevant information contained in the signals under study with the aid of statistical signal processing tools. To achieve this, the student will study advanced techniques of:

- Random signals analysis
- Estimation
- Detection

DESCRIPTION OF CONTENTS: PROGRAMME

DESCRIPTION OF CONTENTS: PROGRAMME

- Parameter estimation
 - Method of moments
 - Maximum likelihood
 - Bayesian estimation
- Signal Estimation
 - MMSE estimation
 - Linear estimation and prediction
 - Optimal and adaptive filtering
- Hypothesis testing
 - Wald tests
 - Likelihood ratio methods
 - Bayesian tests

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

% end-of-term-examination: 30

% of continuous assessment (assignments, laboratory, practicals...): 70

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	70	70
SE3	30	30

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

BASIC BIBLIOGRAPHY

- C. P. Robert, G. Casella Monte Carlo Statistical Methods, Springer, 2004

- H. Stark, J. W. Woods Probability and Random Processes with Applications to Signal Processing, Prentice-Hall, 2002

- L. Wasserman All of statistics, Springer, 2013

- V. Poor An introduction to signal detection and estimation, Springer, 1994