

Academic Year: (2019 / 2020)

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Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: BOUSOÑO CALZON, CARLOS

Type: Electives ECTS Credits : 6.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

No requirements.

OBJECTIVES

The student must acquire the following skills:

- Understand the role of simulation as a tool to analyze communication systems.
- Understand the concept of "model" to represent the objective to be analyzed in a complex communication system.
- Understand the relationship between simulation and optimization as synergistic tools in the analysis and design of communication systems.

At the end of the training process, students will be able to:

- Use computer, mathematical and numerical tools necessary to design, analyze and / or optimize elements of a communication system.

DESCRIPTION OF CONTENTS: PROGRAMME

Topic 1: Introduction

- Current communication systems: complexity and levels.
- Models as perspectives and objectives in the analysis and design of communication systems
- Examples.

Topic 2: Optimization Tools and Game Theory with applications to communication systems

- Introduction to optimization: basic concepts, problem formulation and basic concepts.
- Deal with the real world: continuous variable optimization.
- Making it more difficult: full programming.
- Falcon or pigeon? Game theory is the answer.

Topic 3: Stochastic models and simulation:

- Statistics and Information Theory: alphabets, probabilities and random variables.
- Statistical, time and mixed models: scales.
- Markov: chains, hidden models and examples. Graphic models in general.
- Simulation for Inference; Simple MonteCarlo, Markov-MonteCarlo.

Simulation projects: individual and supervised.

LEARNING ACTIVITIES AND METHODOLOGY

Theoretical lessons and problems

The lessons are composed of theory and practical examples with the aim of providing a better

understanding.

Lab practices

Simulation of the practical cases described during the theoretical lessons.

Practica case.

A practical case in the framework of the cellular communications is proposed for simulation and analysis.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	0
% of continuous assessment (assignments, laboratory, practicals...):	100

The final mark is obtained as a weighted sum described below,

- Practical case (final work): 100%

BASIC BIBLIOGRAPHY

- A. Goldsmith Wireless Communications, Cambridge University Press, 2005
- Convex Optimization Stephen Boyd and Lieven Vandenberghe, Cambridge University Press, 2004
- Jeruchim et al. Simulation of Communications Systems, Plenum, 1984
- T.S. Rappaport Wireless Communications , Prentice Hall , 1996

BASIC ELECTRONIC RESOURCES

- Stephen Boyd and Lieven Vandenberghe . Convex optimization (CVX): <https://web.stanford.edu/~boyd/cvxbook/>