### Simulation and optimization of communication systems

Academic Year: (2023 / 2024)

Review date: 09/06/2021 13:09:46

Department assigned to the subject: Signal and Communications Theory Department Coordinating teacher: MIAH, MD SIPON Type: Electives ECTS Credits : 6.0

Year : 1 Semester : 2

# REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

No requirements.

### OBJECTIVES

The student should acquire the following competences:

- Capacity to design and analyze complex communication systems that combine different types of algorithms (resource allocation, signal processing).

- Capacity to design optimization problems, define their complexity, and obtain a solution using computing tools and signal processing algorithms.

- Learn simulation methods to evaluate the performance of communication systems and their optimization.

At the end of the course the student will be able:

- To handle with ease the mathematical and numerical tools necessary to design, analyze and optimize the elements of a communications system ((physical layer and resource allocation).

- To understand, design, analyze and evaluate complex communication systems that combine several kinds of algorithms.

- To be able to solve practical problems in the design of communication systems using analytical methods and simulation.

### DESCRIPTION OF CONTENTS: PROGRAMME

- 1. Introduction to optimization and search techniques.
- 2. Introduction to simulation and modeling of communication systems. Methods
- 3. Practical application to selected projects.
- 4. Project presentation and discussion.

### 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 (assigments, laboratory, practicals):	100	
The final mark is obtained as a weighted sum described below:		

# 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

- Nemhauser, G. L. and Wolsey, L. A. Integer and Combinatorial Optimization, Wiley-Interscience Series in Discrete Mathematics and Optimization, 1988

- 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/