Wireless Communications

Academic Year: (2021 / 2022) **Review date: 18/05/2021 09:41:35**

Department assigned to the subject:

Coordinating teacher: OLIVA DELGADO, ANTONIO DE LA

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

It is required to have advance knowledge of statistics and network performance

OBJECTIVES

This course presents an overview of the problem of transmitting information without wires. The student will acquire an overview about the problem, based on a review of the fundamental concepts common to all technologies, and being able to develop a critical view of all of them in their application in different areas raised. Schematically, the skills acquired are:
- Overview of the diversity of wireless communications scenarios, being able to grasp the main differences between them
- Key figures of merit of wireless communications.
- Adequacy of existing technologies to each of the above scenarios, with a critical view of cost and benefit of each.
- Fundamentals of each of the proposed schemes and inherent limitations.
- Ability to delve into particular technologies and understand the limitations and advantages intended to address entered.

This course strengthens the basic competence CB6 and the specific competences CE1, CE2, CE3 and CE5. In addition it provides the following specific competences:
- CS 2.3: Competence to go deeper in the knowledge about wireless technologies.

DESCRIPTION OF CONTENTS: PROGRAMME

The course programme is divided in three main blocks:

(1) Analysis of the performance of wireless networks: in this block the performance of wireless networks through statistic tools such as Markov chains is studied, focusing on the impact of the different parameters on its performance.
(2) Optimisation and Configuration of wireless protocols: This block uses the tools learnt in the previous block to optimise the network performance through tools such as Lagrange or KKT.
(3) Design of adaptive algorithms for wireless networks. In this block the student will learn how to use techniques such as theory control and Lyapunov to design adaptive algorithms.

This blocks are not explained consequentially but they are explained within the different technologies explained on each class. Every year the specific topics are revised so the course remains actual.

Specifically, these topics will be addressed during the classes:
- Bianchi model for the performance analysis of IEEE 802.11
- Energy efficiency on wireless networks
- LTE MAC layer
- C-RAN and 5G networks
- Control theory applied to IEEE 802.11
- Linearization of the capacity region of IEEE 802.11
- Opportunistic offloading of wireless networks

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LEARNING ACTIVITIES AND METHODOLOGY

- Lectures presenting each topic
- Labs, including i) exercise resolution, ii) self-learning activities and iii) peer review of scientific articles

ASSESSMENT SYSTEM

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

100% continuous assessment through written tests, exercise build, and participation in the activities offered during class.

Students who do not complete the continuous assessment process will be governed by the rules defined for that purpose by the University

BASIC BIBLIOGRAPHY

- H. Wu, Y. Pan Medium Access Control in Wireless Networks, Nova Science Publishers, 2008.