

Academic Year: ( 2023 / 2024 )

Review date: 27-04-2023

Department assigned to the subject: Signal and Communications Theory Department

Coordinating teacher: MORALES CESPEDES, MAXIMO

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 2

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

This subject does not have specific requirements.

**OBJECTIVES**

Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context

That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study

That students are able to integrate knowledge and face the complexity of formulating judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments

That the students know to communicate their conclusions and the knowledge and last reasons that sustain them to specialized and non-specialized public in a clear and unambiguous way

Ability to identify, define and formulate the problems to solve related to IOT applications. This capacity includes the simultaneous assessment of all the factors at stake, not only technical, but also environmental and civil liability.

Proactive capacity to address and solve problems posed under new or unfamiliar environments, within the context of IoT.

Ability to work as a team, integrating multidisciplinary approaches.

Ability to identify security risks in communications in IoT environments and identify appropriate communication protocols to mitigate the identified risks.

Ability to design and implement communications networks for IoT environments.

Ability to design and control the latest generation wireless networks in IoT applications.

Ability to apply device communication, both among them and globally, in the IoT environment.

The learning outcomes that students should have are:

- Know the different architectures of mobile communication.
- Know the different IoT communication architectures and how they are integrated into mobile communication architectures.
- Ability to design a communication architecture in IoT, integrating it into the ideal mobile communication architecture.
- Ability to design communication components, transmitters and receivers in IoT.
- Ability to develop equipment and radio frequency subsystems in IoT.
- Ability to design electromagnetic sensors and antennas for the radiocommunications systems used in IoT.
- Ability to integrate sensors and antennas in IoT transmitters and receivers.
- Ability to analyze, design and plan complete mobile communications systems according to the fundamental requirements and quality parameters.

## DESCRIPTION OF CONTENTS: PROGRAMME

- Introduction to IoT communications systems
- Modulations and architectures for the IoT
- Wireless communications for the IoT: Wifi, bluetooth, sensor networks.
- Mobile communications systems for the IoT: 4G and 5G
- Localization systems
- Emerging systems

## LEARNING ACTIVITIES AND METHODOLOGY

### TRAINING ACTIVITIES OF THE STUDY PLAN REFERRED TO MATTERS

AF1 Theoretical class  
AF4 Laboratory practices  
AF5 Tutorials  
AF6 Group work  
AF7 Individual student work  
AF8 Partial and final exams

#### Code

Activity No. Total hours No. Presential hours% Presence Student

AF1 39 39 100

AF4 24 24 100

AF6 60 0 0

AF7 96 0 0

AF8 6 6 100

TOTAL MATTER 225 69 31%

### EDUCATIONAL TRAINING METHODOLOGIES OF PLAN REFERRED TO SUBJECTS

MD1 Exhibitions in the teacher's class with support of computer and audiovisual media, in which the main concepts of the subject are developed and the bibliography is provided to complement the students' learning.

MD2 Critical reading of texts recommended by the teacher of the subject: Press articles, reports, manuals and / or academic articles, either for further discussion in class, or to expand and consolidate the knowledge of the subject.

MD3 Resolution of practical cases, problems, etc. ¿posed by the teacher individually or in groups.

MD4 Exhibition and discussion in class, under the teacher's moderation of topics related to the content of the subject, as well as case studies

MD5 Preparation of papers and reports individually or in groups.

## ASSESSMENT SYSTEM

### ASSESSMENT SYSTEMS OF THE STUDY PLAN REFERRED TO SUBJECTS

Participation in class: 10%

Individual or group work carried out during the course: 20%

Matlab practices: 30%

Final exam: 40%

**% end-of-term-examination:** 40

**% of continuous assessment (assignments, laboratory, practicals...):** 60

## BASIC BIBLIOGRAPHY

- Freeman, Roger L. "Telecommunication Transmission Handbook", John Wiley & Sons, 1991
- Rolando Herrero "Fundamentals of IoT Communication Technologies", Springer, 2021