



## ANTENNES, SIGNAL ET PROCESSEURS

### ANTENNA, SIGNAL AND PROCESSORS

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| Lecturers : 16.0 | TC : 0.0 | PW : 10.0 | Autonomy : 4.0 | Study : 2.0 | Project : 0.0 | Language : FR

#### Objectives

We live in a world bathed in electromagnetic waves in which wireless systems are growing rapidly. The first objective of this course is to give a circular view of the various components and disciplines involved in the design of electromagnetic wireless systems and to expose three of those in particular: the antennas, the signals and the processors. For this purpose, the radar and telecoms systems will be considered as applicative context. If in principle both of these systems use antennas and processors so as to propagate and process signals, we will see that they offer a diversity of issues that will be discussed in this course.

**Keywords :** Antenna, Radiation diagram, Directivity, Polarization, Adaptation, Frequency bandwidth, Signal processing, Digital modulation, information coding, channel equalization, Radar processing, Detection/Estimation, Processor, Onboard electronic systems.

#### Programme

I - Antennas :

- a) Radiation physics
- b) Parameters to size an antenna for a given problem: radiation pattern, directivity, gain, polarization, etc

II - Signal:

- a) Radar processing: signal model, optimal receiver, detection, estimation
- b) Information transmission: coding, digital modulations, channel equalization

III - Processors:

- a) Architecture and design through generations of telecommunication networks

#### Learning outcomes

- To design an antenna according to a given specification
- To design a digital modulation scheme for information transmission
- To implement a radar processing scheme on an Arduino card
- To use a HF measurement system, a vector network analyzer and an oscilloscope

#### Independent study

**Objectifs :** 2 slots of 2 hours are left in autonomy for the finalization of the TP reports.

**Méthodes :**

#### Core texts

Constantine A. Balanis, *ANTENNA THEORY*, Wiley, 2005

François Le Chevalier *PRINCIPES DE TRAITEMENT DES SIGNAUX RADAR ET SONAR*, Masson, 1989

Manuel Jiménez, Rogelio Palomera, Isidoro Couvertier *INTRODUCTION TO EMBEDDED SYSTEMS*, Springer-Verlag, 2014

#### Assessment

Final mark = 50% knowledge + 50% know-how

Knowledge = 100% final exam

Know-how = 100% continuous assessment