

## Course guide

### 230632 - ARRAYS - Array Processing and Smart Antennas

**Last modified:** 11/04/2025

**Unit in charge:** Barcelona School of Telecommunications Engineering  
**Teaching unit:** 739 - TSC - Department of Signal Theory and Communications.

**Degree:** MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Optional subject).  
MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Optional subject).

**Academic year:** 2025    **ECTS Credits:** 5.0    **Languages:** Spanish, English

#### LECTURER

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**Coordinating lecturer:** ANA ISABEL PEREZ NEIRA

**Others:** Primer quadrimestre:  
ANA ISABEL PEREZ NEIRA - 10

#### PRIOR SKILLS

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Signal Processing, Communications II.

#### TEACHING METHODOLOGY

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master classes

#### LEARNING OBJECTIVES OF THE SUBJECT

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The objective of the subject is to extend the traditional methods signal processing that use temporal and/or frequency diversity, to the cases of sensor openings with spatial diversity. The procedures, developed in its beginnings in sonar and geophysics, they became common in radar systems. They will later be implemented in telecommunications via satellite and, finally, today represent the only alternative to an increase in capacity and quality of service, simultaneously and without an increase in bandwidth, in the successive generations of radio communications. In this last application, array processing techniques are referred to by generic with the term of smart antennas. The course is structured in topics that successively address the techniques of forming by temporal reference, by address and by code. are finally exposed specific techniques for diversity MIMO communication systems both transmitting and receiving.



## STUDY LOAD

Type	Hours	Percentage
Self study	86,0	68.80
Hours large group	39,0	31.20

Total learning time: 125 h

## CONTENTS

### 1. Introduction to spatial diversity systems (6 hours)

**Description:**

Introduction

**Full-or-part-time:** 6h

Theory classes: 6h

### 2. Beamforming (14 hours)

### 3. Detection and estimation of arrival angle (8 hours)

### 4. Adaptive beamforming (7 hours)

### 5. Tx-Rx Array processing (10 hours)

## GRADING SYSTEM

- Final Examen: 60%

- Participation and class assistance: 40%

## RESOURCES

Other resources: