

**Multidisciplinary Applications in
Telecommunications I**

Code: 102695
ECTS Credits: 6

Degree	Type	Year	Semester
2500898 Telecommunication Systems Engineering	OT	4	1

Errata

The first day of the course, the teacher shall agree with the consensus of all students whether the language of lecturing will be in English instead of in Spanish.

Contact

Name: Maria Angeles Vazquez Castro
Email: Angeles.Vazquez@uab.cat

Use of languages

Principal working language: spanish (spa)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: Yes

Teachers

Daniel Egea Roca
Tan Do-Duy

Prerequisites

Previous knowledge on digital communications.

Objectives and Contextualisation

- Acquire knowledge of theoretical and practical characteristics of satellite communications, namely:
 - Know the fundamentals of orbital physics.
 - Know the different physical and functional subsystems, including their implications.
 - Know the different alternatives of air interfaces.
- Relate and connect subsystems and services.
- Learn the conceptual differences and technological implications of the up-link and down-link.
- Experiment with simulators of real satellite systems using matlab.
- Understand the main standards (DVB) and assess different design criteria.
- Understand the principles of operation of a satellite positioning system.
- Describe the main features of GPS and Galileo.
- Illustrate the main blocks of a navigation receiver and signal processing algorithms involved.
- The sources of error in navigation systems and techniques capable of combating them.

Content

1. Introduction

- Historical notes
- Overview and trends in Satellite Communications

2. Orbital mechanics

- Kepler Laws and forces balancing
- Coordinate systems and orbital parameters
- GEO orbit
- Station Keeping

3. System engineering

- One-link budget
- Two-link budget
- Rain margin
- Adaptive coding and modulation
- Inter- and intra-system interference

4. Standards and technologies

- Understanding DVB
- Broadcasting services
 - DVB-T
 - DVB-H
 - DVB-SH
- Interactive services
 - Quality of Service
 - Quality of Experience
 - Quality of Security
 - DVB-S2
 - DVB-S2X
 - DVB-RCS/2

5. Satellite upcoming new technologies

- Cognitive and software-defined networking.
- Satellite integrated in 5G.