

Degree	Type	Year	Semester
2500898 Telecommunication Systems Engineering	OT	4	1

Contact

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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

Gonzalo Seco Granados
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.