Universitat Autònoma de Barcelona

2020/2021

Telecommunications Transmitters and Receivers

Code: 103518
ECTS Credits: 6

Degree	Type	Year	Semester
2500898 Telecommunication Systems Engineering	OB	3	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Prerequisites

Advanced mathematics, specially in logarithmic calculation.

Deep understanding on the dB, dBm and dBw concept.

Objectives and Contextualisation

To know the different transmitters and receivers architectures, the subsystems that constitute them, and to avaluate their properties and characteristics. Avaluate the quality of the subsystems in terms of noise, distortion and analysis of the signals. To know the official nomenclature used in the different frequency bands and their use. To apply the transmission equation in order to calculate the power balance and determine the noise parameters. To understand the performance and select electronic components in RF applications.

Competences

- Apply the necessary legislation in the exercise of the telecommunications engineers profession and use the compulsory specifications, regulations and standards.
- Communication
- Develop ethics and professionalism.
- Develop personal work habits.
- Develop thinking habits.
- Select and devise communication circuits, subsystems and systems that are guided or non-guided by electromagnetic, radiofrequency or optical means to fulfil certain specifications.
- Work in a team.

Learning Outcomes

1. Assume social, ethical, professional and legal responsibility, if applicable, derived from professional exercise.
2. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
3. Describe the principles for the management of the radio-electric spectrum and the allocation of frequencies.
4. Develop independent learning strategies.
5. Develop systemic thinking.
6. Develop the capacity for analysis and synthesis.
7. Select radiofrequency, microwave, broadcasting, radio-link and radio-determination circuits, subsystems and systems.
8. Work cooperatively.

Content

Lesson 1. - Introduction

Lesson2. - Transmistters and Receivers Architectures

Lesson3. - RF Front-End - Noise

Lesson4. - RF Front-End - Non Linearities

Lesson5. - Frequency Synthetizers

Methodology

A methodoloy based on theory lessons, problems resolution and lab sessions are used in this subject.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab sessions	12	0.48	5, 6, 7, 8
Problems	12	0.48	1, 5, 6, 7
Theory Lessons	26	1.04	1, 3, 5, 6, 7
Type: Autonomous			
Study	85	3.4	1, 3, 5, 4, 6, 7, 8

Assessment

(In case the subject is online, Exam 1 will be substituted by periodical exercises with the same average 20%).

1. - Final Mark= MAX(0.1*Deliverables+0.2*Ex.1+0.3*Ex.2+0.4*Lab , 0.6*Ex.2+0.4*Lab)

2. - Minimum mark required in Exam 2 to pass the subjetc = 4. In this case, the recuperation exam has to be done.

3. - It will be that a student is attending the subject when he/she is evaluated in a Lab session or exam.

A synthesis exam will be implemented at the end of the course, in the provided calendar by the school, for those students that failed any of the 2 exams.

NF = 0,4*prac + 0,6*Ex_recup

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Deliverables	10%	1	0.04	2, 5, 4, 6, 7
Exam 1	20%	2	0.08	1, 3, 5, 4, 6, 7
Exam 2	30%	2	0.08	1, 3, 5, 4, 6, 7
Lab Sessions	40%	10	0.4	2, 5, 4, 6, 7, 8

Bibliography

ROHDE, U.L.; WHITAKER, J.; BUCHER, T.N. Communication receivers: principles and design. 2nd ed. McGraw-Hill, 1996

ROHDE, U.L.;RF/Microwave Circuit Design for Wireless Applications. McGraw-Hill, 2000

KRAUSS, H. L.; BOSTIAN, CH. W.; RAAB, F. H. Solid state radio engineering. John Wiley and Sons, 1980

DAVID M. POZAR; Microwave and RF Design of Wireless Systems. John Wiley & Sons, Inc. 2001

RICHARD J. CAMERON; CHANDRA M. KUDSIA; RAAFAT R. MANSOUR; Microwave filters for communication systems: Fundamentals, Design, and Applications. John Wiley & Sons, Inc. 2007