UAB
Universitat Autònoma de Barcelona

Telecommunications Transmitters and Receivers

Code: 103518
ECTS Credits: 6

2025/2026

Degree	Type	Year
Telecommunication Systems Engineering	OB	3

Contact

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Teachers

(External) Carlos Caballero

Teaching groups languages

You can view this information at the of this
document.

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 engineer's profession and use
  the compulsory specifications, regulations and standards.
- Communication
- Develop ethics and professionalism.

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- 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

Activities and Methodology

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

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

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Lab Sessions	40%	10	0.4	2, 5, 4, 6, 7, 8
Partial Exam 1	25%	2.5	0.1	1, 2, 3, 5, 4, 6, 7
Partial Exam 2	35%	2.5	0.1	1, 3, 5, 4, 6, 7

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

1. - Final Mark= MAX(0.25*ECP+0.35*Ex.2+0.4*Pract , 0.6*Ex.2+0.4*Pract)

2. - Minimum mark required in Exam 2 to pass the subjetc = 4. In case the mark is not reaching the 4, a recuperation exame should be done being the mark for Exam 2 = 0.

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 being the minimum mark 4 to pass the subject.

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

- Lab Sessions will be done in groups of 2 people.

- The mark for each activity could be reviewec with the correspondant teacher by doing previous appointement.

- The mark with honors (MH) will be achievable for those students with total mark higher than 9 (maximum number of students set by the UAB regulation.). If a student have not been evaluated in any activity, the mark will be Not Evaluable.

- This subject do not consider the unique evaluation system.

- The use of IA is forbidden for avaluable activities.

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

Software

Agilent Design Software (ADS)

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	331	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	332	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	331	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	332	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	333	Catalan	first semester	morning-mixed
(TE) Theory	330	Catalan	first semester	morning-mixed