Transmitter and Receiver Electronics

Code: 103519
ECTS Credits: 6

2024/2025

Degree	Type	Year
2500895 Electronic Engineering for Telecommunication	OB	3

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

It is recommended to have passed the subject "Radiation and Guided Waves" and "Basic Electronics"

Objectives and Contextualisation

The overall objective of this subject is to provide the basic knowledge that allows the student to design and analyze components and circuits of radio frequency for their application to the design of transmitters and communications receivers. Emphasis will be put on the circuits that consitute the radiofrequency font end. An introduction to the antennas and their fundamental parameters will be presented. It is intended that the student will be able to design a simple radio frequency receiver at the end of the course.

Competences

- Communication
- Design components and electronic circuits in accordance with specifications
- Design, analyse and propose specialised radiofrequency and microwave components, devices, circuits and systems for telecommunication systems.
- Develop personal work habits.
- Develop thinking habits.
- Work in a team.

Learning Outcomes

1. Adapt to multidisciplinary and international surroundings.
2. Assume and respect the role of the different members of a team, as well as the different levels of dependency in the team.
3. Critically evaluate the work done.
4. Design RF and microwave circuits
5. Determine optimal strategies for the synthesis of communications components and systems on the basis of their needs and specifications.
6. Develop critical thinking and reasoning.
7. Develop independent learning strategies.
8. Develop scientific thinking.
9. Develop systemic thinking.
10. Efficiently use ICT for the communication and transmission of ideas and results.
11. Identify, manage and resolve conflicts.
12. Make one's own decisions.
13. Prevent and solve problems.
14. Select specialized electronic circuits and devices for transmission, routing and terminals in both fixed and mobile environments.
15. Use English as a language of communication and as the reference in professional relations.
16. Work autonomously.

Content

Architecture of the transmitters and receivers.

The RF front end

Electronic circuits of a radiocommunication system (mixers, oscillators, amplifiers, filters and multiplexers, frequency synthesizers, modulators and demodulators).

Antennas, antenna parameters.

Energy model of a radiocommunication system

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Master Classes	26	1.04	4, 5, 14
Practical sessions	12	0.48	4, 5, 13, 14, 16
Problems seminars	12	0.48	4, 5, 13, 14, 16
Type: Supervised			
Tutorials outside of class hours.	8	0.32	4, 5, 13, 14
Type: Autonomous			

Practical sessions preparation	14	0.56	4, 5, 7, 12, 13, 14, 16
Solve problems at home	25	1	4, 5, 6, 7, 12, 13, 14, 16
Study at home	28	1.12	4, 5, 7, 14, 16

Directed activities:

Master Classes: The teacher will explain the topics through the use of slides and blackboard.

Problems seminars: The teacher will carry out, or in some cases the students themselves, sample problems in small groups of students.

Practical sessions: Prior to the session, the student must prepare it and after the session must submit a report.

Note: The teaching materials of the subject will be available in the Virtual Campus of the UAB

Supervised activities:

Tutorials outside of class hours.

Autonomous activities:

Autonomous study by the student.

Resolution of class problems prior to the realization of them.

Preparation of practical sessions.

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
1st partial exam	37.5 %	3	0.12	3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 16
2nd partial exam	37.5 %	3	0.12	3, 4, 5, 6, 7, 8, 9, 12, 13, 14, 16
Delivery of Lab reports	25 %	19	0.76	1, 2, 6, 8, 9, 10, 11, 15, 16

The subject will be evaluated based on two partial written exams with a weight of 37.5% each and the results of practical sessions reports with a weight of 25%.

The partial examns will be averaged between them and if the result is greater than 4 they will make average with the lab reports o to give rise to the final note.

In the case of not passing the subject, the part corresponding to the works can be recovered in a single final exam where all the subject of the course will be evaluated. To participate in the recovery, you must have previously evaluated activities that involve a minimum 2/3 of the final grade of the subject.

Failure to attend any of the practices or not having any note in the works or in the final exam will mean that the student will be declared as not evaluable.

Granting a grade of honor registration is the decision of the faculty responsible for the subject. The regulations of the UAB indicate that MH can only be granted to students who have obtained a final grade equal to or greater than 9.00. You can grant up to 5% of MH of the total number of students enrolled.

Without prejudice to other disciplinary measures deemed appropriate, the irregularities committed by the student that may lead to a variation of the grade of an evaluation act will be scored with a zero. Therefore, copying, plagiarism, cheating, letting copy, etc. in any of the evaluation activities will involve failing with a zero. The evaluation activities qualified in this way and by this procedure will not be recoverable. If it is necessary to pass any of these assessment activities to pass the subject, this subject will be failed directly, with no opportunity to recover it in the same course.

In case of repeating the subject, the same evaluation system as the rest of the students will be followed.

The Single Assessment System is not included in this course.

Bibliography

- W. Tomasi, Sistemas de Comunicaciones Electrónicas, Prentice Hall, 2003.
- D. M. Pozar, Microwave and RF Wireless Systems, New York: John Wiley & Sons, 2001.
- J. J. Carr, Secrets of RF Circuit Design, New York: McGraw-Hill, 2001.
- D. M. Pozar, Microwave Engineering, Segunda ed., New York: John Wiley & Sons, 1998.
- G. Matthaei, L. Young y E. Jones, Microwave filters, impedance-matching networks, and coupling structures, Norwood: Artech House, 1980.
- J.S. H. Hong y M. J. Lancaster, Microstrip Filters for RF/Microwave Applications, New York: John Wiley & Sons, 2001.
- V. Razavi, RF Microelectronis, Upper Saddle River: Prentice-Hall, 1998.
- R. C. Johnson, Antena Enginnering Handbook, New York: McGraw-Hill, 1993.
- J. R. Smith, Modern Communication Circuits, New York: McGraw-Hill, 1997.
- P. H. Young, Electronic Communication Techniques, New York: Macmillan, 1994.

Software

In this subject no program will be used since the practices will be carried out by means of assemblies in the laboratory

Language list

Name	Group	Language	Semester	Turn

(PAUL) Classroom practices	321	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	321	Catalan	first semester	afternoon
(PLAB) Practical laboratories	322	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	323	Catalan	first semester	morning-mixed
(TE) Theory	320	Catalan	first semester	morning-mixed