UAB
Universitat Autònoma de Barcelona

Access Technologies

Code: 102697
ECTS Credits: 6

2025/2026

Degree	Type	Year
Telecommunication Systems Engineering	OT	4

Contact

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Teaching groups languages

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

Prerequisites

It is advisable to have completed the courses "Fundamentals of Communications" and "Digital Signal Processing".

Objectives and Contextualisation

The course focuses on the study of access technologies, from the physical layer at the modulation level to the deployment of telecommunications networks at the infrastructure level. The objectives are:

1. To understand the general principles of operation of these technologies.
2. To design the corresponding schemes for transmission and reception.
3. To comprehend the restrictions of each technology in terms of available resources, in order to design efficient systems.
4. To know the basic characteristics of real systems (classic and quantum).
5. To understand the real problems of installation, operation and maintenance of access networks
6. To understand how is the spectrum managed
7. To understand the standardization processes necessary to implement these networks

Competences

- Apply deterministic and stochastic signal processing techniques to the design of communication subsystems and data analysis.
- Apply the necessary legislation in the exercise of the telecommunications engineer's profession and use the compulsory specifications, regulations and standards.
- Communication
- Design and dimension multiuser communication systems using the principles of communication theory under the restrictions imposed by the specifications and the need to provide a quality service.
- Develop personal work habits.
- Develop thinking habits.
- Learn new methods and technologies, building on basic technological knowledge, to be able to adapt to new situations.
- Work in a team.

Learning Outcomes

1. Apply signal processing techniques in order to improve the features of multiuser systems.
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. Build, exploit and manage telecommunications networks from the point of view of access technologies.
4. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
5. Develop critical thinking and reasoning.
6. Develop independent learning strategies.
7. Distinguish multiple access technologies based on digital signal processing techniques.
8. Evaluate the advantages and disadvantages of different technological options for the deployment or implementation of emerging communication systems.
9. Measure the features of different access technologies in terms of multiuser capacity.
10. Prevent and solve problems.
11. Use techniques based on telecommunication networks, services and applications both in fixed and mobile, and local or long distance environments with different bandwidths, including television and data.
12. Work autonomously.

Content

Session 1. Spectrum

Session 2. From 5G to 6G

Session 3. Standardization

Session 4. Standardization: ETSI

Session 5. Standardization: DVB

Session 6. Satellite Access Technologies - Orbits

Session 7. Satellite Access Technologies - Link Budget

Session 8. Satellite Access Technologies - Life Cycle

Session 9. Quantum Technologies

Laboratory.

Session 1. CONOPs (Concept of Operations)

Session 2. Architecture and Service

Session 3. Numerical Calculations

Session 4. Presentations

This structure provides a solid foundation for understanding the latest innovations and trends in telecommunications, especially in the context of the evolution of satellite communication technologies and the transition from 5G to 6G. The laboratory sessions are designed to apply these theoretical concepts to practical and operational situations, ensuring a deep and applied understanding of the topics covered.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Laboratory	12	0.48	1, 4, 3, 6, 5, 7, 9, 10, 12, 11, 8
Master class	38	1.52	1, 5, 7, 9, 10, 11, 8
Type: Supervised			
Tutorships	2	0.08	1, 4, 3, 7, 9, 10, 11, 8
Type: Autonomous			
Individual work	80	3.2	1, 3, 6, 5, 7, 9, 10, 12, 11, 8

Activities:

- Master classes: exposition of theoretical contents and analysis of practical cases.
- Laboratory practices: application of the concepts and techniques presented to the master classes in different practical cases.
- Participatory activities such as a "brainstorm" session, contests, "role play", case resolution.
- For some lab sessions, each team must have at least one laptop.

Autonomous activities:

- Study of the theoretical and practical contents of the subject.
- Completion of case planning and resolution exercises.
- Search of bibliography.

The use of artificial intelligence is allowed and encouraged in this course, as long as its use is clearly explained: how it was used, why, and for what purpose. Justifying its application within the context of the project is mandatory.

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
Developement and exercices presentation	60%	14	0.56	1, 2, 4, 3, 6, 5, 7, 9, 10, 12, 11, 8
PlaB	40%	4	0.16	4, 5, 7, 9, 12, 8

Final qualification will be based on the exercices and activities at class.

There will be around 3 exercises defining 60% of the qualification, and a practic part in PlaB that will define 40% of the qualification. Active participation in class can rise the qualification up to one additional point. Both

the exercises and PLaB should have a qualification above 3, otherwise the student will have the oportunity to have a final exam related to the whole subject.

Ater being qualified at least of 2 thirds of the total subject, the student will have the oportunity to have a final exam related to the whole subject. This exam will be after finishing the standard activities. In case the student does not attend this exam, there won`t be a second chance.

In case of failing to present 2 thirds of the evaluation activities the sudent will be considered unqualifiable.

Honors are decided by the professor of the subject only if finla qualification is over 9.00 and no more than 5% of students can be awarded with this honors.

Notwithstanding other disciplinary measures deemed appropriate, and in accordance with the academic regulations in force, assessment activities will receive a zero (0) whenever a student commits academic irregularities that may alter such assessment. Assessment activities graded in this way and by this procedure will notbe re-assessable. If passing the assessment activuty or activities in question is required to pass the subject, the awarding of a zero (0) for disciplinary measures will also entail a direct fail for the subject, with no opportunity to re-assess this in the same acadeimc year. Irregularities contemplated in this procedure include, among others:

- the total or partial copying of a practical exercice, report, or any other evaluation activity;
- allowing others to copy;
- presenting group work that has not been done entirely by the members of the group;
- presenting anymaterials prepared by a third party as one's own work, even if these materials are translations or adaptations, including work that is not original or exclusively that of the student;
- having communication devices (such as mobile phones, smart watches, etc.) accessible during theoretical-practical assessment tests (individual exams).
- talk to other student during the individual practical or theoretical tests.
- copying or trying to copy from other students during the individual practical or theoretical tests.
- using or trying to use writen material related to the subject during the individual practical or theoretical tests when they have not been explicitly allowed.

When a student is involved in any evaluation irregularity, the final mark of the course will be the lowest value considering 3.0 and the weighted average of the grades (and no compensation is thus possible).

Bibliography

- M. Bonet, El imperio del aire, Ed. UOC, 2016
- Jose F Montserratm Mario García, Juan José Olmos, Narcís Cardona, 3GPP LTE-Advanced y su evolución hacia la 5G móvil

Software

No specific SW is required. Standard Office tools will be needed, text applications and spread sheet. Participation tools like Kahoot will also be used.

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	English	second semester	morning-mixed
(PLAB) Practical laboratories	331	English	second semester	morning-mixed
(TE) Theory	330	English	second semester	morning-mixed