

Communications Systems Design

Code: 42837
 ECTS Credits: 6

2025/2026

Degree	Type	Year
Telecommunication Engineering	OB	1

Contact

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

It is required background on Digital Communications and Communication Systems.

Objectives and Contextualisation

System design requirements and functionalities are oriented to customer requirements and can become highly in
 Design alternatives and system validation are part of the design process,

Unlike the usual teaching in an engineering course, the general objective

Detailed objectives include familiarizing students with systems thinking tr
 The content provides work guidelines but never exact rules, which deper
 Examples of real systems will be described that will inspire students in th

Competences

- Capacity for applying theory of information methods, adaptative modulation and channel coding as well as advanced techniques for digital signal processing in telecommunications and audiovisual systems.
- Capacity for designing and dimensioning transport, diffusion and distribution networks for multimedia signals.
- Capacity for implementing systems using cable, lines, satellite in fixed and mobile communications environments.
- Capacity for modelling, designing, introducing, managing, operating, administrating and maintaining networks, services and content.
- Capacity for planning, decision-making and packaging of networks, services and applications considering the quality of service, direct and operating costs, the implementation plan, supervision,

security procedures, scaling and maintenance and for managing and ensuring quality in the development process.

- Demonstrate an entrepreneurial, creative and innovative spirit
- Student should possess the learning skills that enable them to continue studying in a way that is largely student led or independent
- Students should know how to apply the knowledge they have acquired and their capacity for problem solving in new or little known fields within wider (or multidisciplinary) contexts related to the area of study
- Students should know how to communicate their conclusions, knowledge and final reasoning that they hold in front of specialist and non-specialist audiences clearly and unambiguously

Learning Outcomes

1. Demonstrate an entrepreneurial, creative and innovative spirit
2. Design and obtain coding and modulation techniques in communications systems.
3. Design communications systems considering quality requirements and the services offered.
4. Design systems considering quality requirements and communications services.
5. Identify and classify multimedia diffusion and distribution mechanisms in radio access networks.
6. Recognise design strategies for mechanisms to assign resources in radio access networks.
7. Student should possess the learning skills that enable them to continue studying in a way that is largely student led or independent
8. Students should know how to apply the knowledge they have acquired and their capacity for problem solving in new or little known fields within wider (or multidisciplinary) contexts related to the area of study
9. Students should know how to communicate their conclusions, knowledge and final reasoning that they hold in front of specialist and non-specialist audiences clearly and unambiguously

Content

1. Introduction: System Thinking.
2. Engineering Systems Design.
3. Elements of Communication Systems.
4. Design Phases: Problem Statement and Requirements.
5. Design Phases: Functional and Physical Architecture.
6. Design Phases: System Verification and Validation (V&V).
7. Life Cycle.
8. Optimization.

Laboratory:

Session 0. System Ideation.

Session 1. Problem Statement and Requirements Gathering.

Session 2. System Design: Functional and Physical Architecture.

Session 3. System Verification and Validation (V&V).

Session 4. Student Project Presentations.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Supervised	45	1.8	2, 3, 4, 5, 8, 7, 6
Type: Supervised			
Student's work	15	0.6	1, 2, 3, 4, 5, 8, 9, 7, 6
Type: Autonomous			
Lectures	86	3.44	1, 2, 4, 3, 5, 8, 9, 7, 6

The methodology will consist of lectures and study cases.

The UAB Virtual Campus (<https://cv.uab.cat>) will be used as the online platform for communication with students.

The students will be given two examples of requirements-driven full design study cases after which, teams of students will work on their own (interdisciplinary) design cases.

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

Continuous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
A	A	1	0.04	1, 2, 3, 4, 5, 8, 9, 7, 6
B	0.25	1	0.04	3, 4, 8
C	0.25	1	0.04	1, 2, 3, 4, 5, 8, 9, 7, 6
D	0.25	1	0.04	1, 2, 3, 4, 5, 8, 9, 7, 6

This course does not include the possibility of a single final assessment.

Evaluation

Theory: 50% (individual evaluation)

50% concept questionnaire 50% system functional analysis

Laboratory: 50% (team evaluation)

50% laboratory session submissions 50% final report and presentation

The option to improve the obtained grades will be offered in case of error or low score (<7). This will be done by providing a set of specific potential improvements on the presented design, which will be submitted before deciding the final grade. The grade will be "NOT PRESENTED" as long as there are no evaluation records during the general evaluation period.

Note on copying, plagiarism, and other irregularities.

Without prejudice to other disciplinary measures that may be deemed appropriate, and in accordance with current academic regulations, irregularities committed by a student that may lead to a variation in the grade of an evaluable activity will be graded with a zero (0). Evaluation activities graded in this way and by this procedure will not be recoverable. If it is necessary to pass any of these evaluation activities to pass the course, this course will be directly failed, with no opportunity to recover it in the same term.

These irregularities include, among others:

- total or partial copying of a practice, report, or any other evaluable activity;
- letting others copy;
- presenting a group work not entirely done by the group members (applied to all members, not just those who did not work);
- presenting as own materials produced by a third party, even if they are translations or adaptations, and in general works with non-original and exclusive elements of the student;
- having communication devices (such as mobile phones, smartwatches, pens with cameras, etc.) accessible during individual theoretical-practical evaluation tests (exams);
- talking to classmates during individual theoretical-practical evaluation tests (exams);
- copying or attempting to copy from other students during theoretical-practical evaluation tests (exams);
- using or attempting to use writings related to the subject during theoretical-practical evaluation tests (exams), when these have not been explicitly permitted.

The numerical grade in the record will be the lower value between 3.0 and the weighted average of the grades in case the student has committed irregularities in an evaluation act (and therefore passing by compensation will not be possible). In future editions of this course, a student who has committed irregularities in an evaluation act will not be granted any of the evaluation activities completed.

In summary: copying, letting others copy, or plagiarizing (or attempting to) in any of the evaluation activities equals a FAIL, not compensable and without validations.

Bibliography

1. Alan Dennis, Barbara Haley Wixom, David Tegarden, "Systems Analysis and Design: An Object Oriented Approach with UML", 5th Edition, Wiley April 2015.
2. Dennis M. Buede, "The Engineering Design of Systems: Models and Methods", Wiley 2009.

Software

Not required.

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
(TEmRD) Teoria (màster RD)	1	English	first semester	morning-mixed