

## Instrumentation I

Code: 102736  
ECTS Credits: 6

**2025/2026**

Degree	Type	Year
Electronic Engineering for Telecommunication	OB	3

### Contact

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### Teachers

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### Teaching groups languages

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

### Prerequisites

Basic knowledge corresponding to the subjects of "Components and electronic circuits" and "Analogue electronic amplifiers.

### Objectives and Contextualisation

Describe the principles, architectures and limitations of measurement systems. Identify and use different transducers.

### Competences

- Communication
- Develop ethics and professionalism.
- Develop personal attitude.
- Develop personal work habits.
- Develop thinking habits.

- Perform measurements, calculations, estimations, valuations, analyses, studies, reports, task-scheduling and other similar work in the field of telecommunication systems
- Resolve problems with initiative and creativity. Make decisions. Communicate and transmit knowledge, skills and abilities, in awareness of the ethical and professional responsibilities involved in a telecommunications engineer's work.
- Work in a multidisciplinary group and in a multilingual environment, and communicate, both in writing and orally, knowledge, procedures, results and ideas related with telecommunications and electronics
- Work in a team.

## Learning Outcomes

1. Assume and respect the role of the different members of a team, as well as the different levels of dependency in the team.
2. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
3. Contribute to society's welfare and to sustainable development.
4. Design analogue and digital, analogue-digital conversion and digital analogue electronic circuits for telecommunication applications and computing.
5. Develop critical thinking and reasoning.
6. Develop independent learning strategies.
7. Develop the capacity for analysis and synthesis.
8. Maintain a proactive and dynamic attitude with regard to one's own professional career, personal growth and continuing education. Have the will to overcome difficulties.
9. Specify and use electronic instrumentation and measurement systems.
10. Use communication and computer applications to support the development and operation of electronic applications.
11. Work autonomously.
12. Work cooperatively.

## Content

Introduction to measurement systems. Sensors and conditioning: basic types of sensors and signal conditioning (

Introduction to electronic instrumentation: General concepts and terminology. Errors in measurements.

Sensors and conditioning circuits: Sensor classification. Resistive sensors and the Wheatstone bridge. Sensors of variable reactance, electromagnetic and generators and conditioning circuits.

Amplifiers for instrumentation: differential amplifiers and instrumentation amplifiers

## Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
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Type: Directed

Laboratory classes	15	0.6	1, 2, 6, 7, 5, 4, 9, 8, 12, 11
Master classes	20	0.8	7, 5, 4, 9
Problems and cases seminars	15	0.6	1, 2, 6, 7, 5, 4, 9, 8, 12, 11, 10

Type: Supervised

PBL sessions	10	0.4	1, 2, 7, 5, 4, 9, 8, 12
Tutorials	10	0.4	4, 9

Type: Autonomous

Individual study	20	0.8	6, 7, 5, 4, 9, 8, 11, 10
PBL oriented work	20	0.8	1, 2, 6, 7, 5, 4, 9, 8, 12, 11, 10
Preparation of laboratory work and report writing	10	0.4	1, 2, 6, 7, 5, 4, 9, 12, 11, 10
Problem solving and cases activities preparation	22	0.88	1, 2, 6, 7, 5, 4, 9, 8, 12, 11
Report writing and preparation of oral presentations	5	0.2	1, 2, 12, 10

The teaching methodology will include, apart from the autonomous work, directed and supervised activities. For t

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
Cases solving	25%	0	0	1, 2, 3, 6, 7, 5, 4, 9, 8, 12, 11, 10
Laboratory lessons	25%	0	0	1, 2, 6, 7, 5, 4, 9, 8, 12, 11, 10
Written exam	50%	3	0.12	2, 7, 5, 4, 9, 11

#### Cases

Throughout the semester, cases will be proposed that the student must solve autonomously, in group, outside the classroom.

- The cases, together with their follow-up sessions, are compulsory and will represent 25% of the mark of the subject. The mark will take into account the proposed solution, the report and the evaluation made by the professor during the follow-up sessions.

- The attendance to the follow-up sessions is mandatory. In case the student does not attend, without justification, it will be considered that the corresponding case has not been done and, therefore, the student cannot be evaluated.
- To pass the course, all the proposed cases must have been solved (what includes the attendance to the follow-up sessions) and have obtained a minimum weighted mark of 4.5, to be able to weight with the marks of examination and laboratory.
- Keep in mind that this part is not recoverable and, therefore, if this part is failed (mark smaller than 4.5), the subject cannot be passed.

#### Laboratory lessons

- The realization of all the laboratory classes is mandatory.
- For a lab practice to be considered completed, it is necessary to attend the corresponding lab session and have completed all the scheduled work related to the practice before and/or after the corresponding session (if applicable).
- The mark obtained in the laboratory part will constitute 25% of the final mark of the subject.
- To pass the course, it is mandatory to attend to all the laboratory classes and have a minimum average mark of 4.5.
- It must be kept in mind that laboratory practices are not recoverable and, therefore, if this part is failed, the subject cannot be passed.
- The procedure for the validation of practices carried out in previous courses (if applicable) will be established at the beginning of the semester and will be published in the cv.
- Any incident known in advance that prevents the student of attending a lab practice session and/or case tutorial must be communicated BEFORE the session to the teaching staff, who, after evaluating the reason, will decide what measures to take.

#### Exams

- There will be two partial exams during the semester.
- The mark of the first partial exam will constitute 66% of the final mark of the exam and the second part the remaining 34%. The mark obtained between the two exams will constitute 50% of the mark of the subject.

Requirement: Minimum mark of 3 in each of the partial exams and 4.5 of average between the two partial exams to pass the subject.

In case that the mark of some of the partial exams is lower than 3, the student must do the final exam.

- If the final mark of the partial exams is lower than 4.5, or in one of the partial ones it is lower than 3, the student can make the final exam, in which ALL the contents of the subject will be included, provided that the conditions to access to this final exam are met.
- If the final weighted mark (from exams, lab practices and cases) is smaller than 5, the student must take the final exam.
- The student can do the final exam whenever he has done the cases and the laboratory, which are mandatory in both cases, with a minimum mark of 4.5 each.
- If the student must take the final exam, a minimum of 4.5 will be required in the mark of this exam to weight its mark with the rest of marks.

Final mark in case of failing.

In case the student does not pass the subject, to determine the final mark that will appear in the student record, the following cases are considered:

1. The student has not attended to any of the partial exams or the final exam. The final mark 'Not evaluable'.
2. He/she has not attended to the final exam, but to one or both partial exams and the mark in the partial exams is above the required minimum. If the average of the partial marks does not reach the minimum mark necessary to weight with the rest of marks, the final mark will be the average of the notes of the partial exams.
3. He/she has not attended to the final exam, but to one or both partial exams. If in some of the partial exams the mark is under the required minimum, the final mark will be the average of the marks in the partial exams, with a maximum of 4.5
4. He/she has attended to the final exam, but the grade is less than the minimum necessary for weighting with the rest of marks. The final mark will be the highest among the average of the partial and final exam marks, taking into account the considerations on the marks of the partial exams mentioned in points 2 and 3.
5. The student has attended to one or both of the partial exams and / or the final exam, but has not done ALL the laboratory or the cases (or has failed some of these parts). The final mark of the subject will be that of the failed part (if it has been failed) or a 'Not assessed' (if it has not been done).

Excellent with honors.

The excellent with honors mark will be given on the basis of the criteria fixed by the professors at the end of the year, taking into account the number that can be given and the overall evolution of the course.

Remarks

Any other case not included in this regulation will be analyzed individually.

The dates of continuous evaluation and delivery of works will be published on the virtual campus and may be subject to possible changes of programming due to adaptation to possible incidents. You will always be informed on the virtual campus about these changes since it is understood that this is the usual platform for the exchange of information between professors and students.

For each evaluation activity, a place, date and time of review will be indicated in which the student may review the activity with the professor. If the student does not attend to this review, this activity will not be reviewed later.

General remarks

Notwithstanding other disciplinary measures that are deemed appropriate, and in accordance with the current academic regulations, the irregularities committed by the student who can lead to a variation in the rating of an act of evaluation, as copying or letting copy an exercise or any other evaluation activity will imply failing with a zero, and if it is necessary to pass it, the whole subject will be failed. Qualified evaluation activities by this procedure will not be recoverable, and therefore the subject will be failed directly without opportunity to recover it in the same academic year.

Professors reserve the right to modify the evaluation method in those cases where there are indications of possible irregularities in the student's assessment.

## Bibliography

J.C. Alvarez et al., "Instrumentación electrónica", Thomson-Paraninfo, 2006

R. Pallàs-Areny, "Sensores y acondicionadores de señal".

P.H. Sydenham, N.H. Hancok and R. Thorn, "Introduction to Measurement Science and Engineering", John Wiley & Sons, 1989.

## Software

LabVIEW Software, for electronic instrumentation control.

SPICE

## 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	321	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	322	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	321	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	322	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	323	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	324	Catalan/Spanish	first semester	morning-mixed
(TE) Theory	320	Catalan	first semester	morning-mixed