UAB
Universitat Autònoma de Barcelona

Instrumentation II

Code: 102735
ECTS Credits: 6

2024/2025

Degree	Type	Year
2500895 Electronic Engineering for Telecommunication	OB	3

Contact

Name: Marc Porti Pujal

Email: marc.porti@uab.cat

Teachers

Montserrat Nafría Maqueda

Marc Porti Pujal

Teaching groups languages

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

Prerequisites

Basic knowledge corresponding to the subjects of "Electronic components and circuits" and "Analog electronics"

Especially necessary are those of the subject "Instrumentation I", of which Instrumentation II is a clear continuatic

Objectives and Contextualisation

Describe the working principle of the A/D and D/A converters, the data acquisition cards and different

general purpose electronic instruments, to introduce the specifications that characterize them, as well

as to define the errors that can be committed in a measure.

Identify the main sources of noise and interference and analyze their effects on instrumentation circuits.

Competences

- Communication
- Develop personal attitude.
- 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.
- 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. Design analogue and digital, analogue-digital conversion and digital analogue electronic circuits for telecommunication applications and computing.
4. Develop critical thinking and reasoning.
5. Develop independent learning strategies.
6. Develop the capacity for analysis and synthesis.
7. Document the specifications, design, implementation and testing of instrumentation and control systems.
8. Identify problems with electromagnetic interference and compatibility.
9. 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.
10. Specify and use electronic instrumentation and measurement systems.
11. Translate the concept of noise to electronic systems and analyse its effects on instrumentation circuits.
12. Use communication and computer applications to support the development and operation of electronic applications.
13. Work autonomously.
14. Work cooperatively.

Content

Isolation amplifiers.

Filters: Kinds of filters and implementation in instrumentation systems.

Noise: Basic concepts. Kinds of noises in amplifiers. Reduction techniques.

A/D and D/A converters: Specifications and architectures.

Data acquisition cards for instrumentation systems. Introduction to the control of cards and converters through La

Interferences: Interferences and electromagnetic compatibility in instrumentation systems. Reduction techniques.

Basic instruments: Oscilloscope and spectrum analyzer.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab sessions	15	0.6	1, 2, 3, 4, 5, 6, 9, 10, 13, 14
Master classes	20	0.8	3, 4, 6, 8, 10, 11
Problems and cases seminarys	15	0.6	1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14
Type: Supervised			
ABP sessions	10	0.4	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 14
Tutorials	10	0.4	3, 8, 10, 11
Type: Autonomous			
ABP oriented work	20	0.8	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14
Preparation of lab sessions and report	10	0.4	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14
Preparation of reports and presentations	5	0.2	1, 2, 7, 12, 14
Resolution of problems and preparation of cases	22	0.88	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14
Study	20	0.8	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

The teaching methodology will combine, in addition to autonomous work, directed and supervised activities. In the directed activities, master classes, problem and case seminars and laboratory sessions will be combined. In the lectures, the lecturer will synthesize and expose the fundamental concepts of the subject. In the seminars of problems and cases, the students will solve problems related to the subject. In laboratory sessions, the student will put into practice, in the laboratory, the acquired knowledge.

The supervised activities will consist of tutorials, in which the student, with a previous appointment

with the lecturer, will be able to solve, individually or in group, doubts derived from the realization of

the rest of activities (directed and autonomous).

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	30%	0	0	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
Resolution of cases and problems	25%	0	0	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
Written test	45%	3	0.12	2, 3, 4, 5, 6, 8, 10, 11, 13

Activities

Throughout the semester, activities that the student must solve autonomously out and/or in the classroom

will be proposed.

- The activities, which are mandatory, will represent 15% of the grade of the subject.

- Requirement: To have carried out all the activities and have minimum grade of

5 in the average of the grades of the activities, to be able to pass the subject.

- If the minimum of 5 is not reached in the activities grade, the student may take the final exam provided

that the conditions to access it are met, which will include ALL the contents of the subject.

Laboratory sessions.

- Attendance to the laboratory sessions is mandatory.

- The obtained grade in the laboratory sessions will correspond to 30% of the final grade of the subject.

- In case that any of the lab sessions has not been performed,

the Student will fail them and the grade will be zero.

Requirement: To have carried out all the lab sessions and have a minimum grade of 5 to pass the subject.

It must be taken into account that laboratory sessions are not recoverable and, therefore, if this part is

failed, the subject can not be passed.

Exams

- There will be two partial exams during the semester, each with a weight of 50%.

The graded obtained between the two exams will correspond to a 55% of the grade of the subject.

Requirement: Minimum score of 3 in each of the partial tests and 4.5 of average between the two

partial test to be weighted with other sections.

- In case the final grade of partial tests is less than 4.5 (or in any of the partial exams is less than 3),

the student may takethe final exam provided that the conditions to access it are met, which will

include ALL the contents of the subject.

The student can take the final exam as long as he has carried out all the activities (which are

compulsory), all the laboratory sessions (compulsory and with a minimum grade of 5) and at

least a partial test. If the exam is empty, it will be considered that the student has NOT done

the partial exam.

- If the student has to go to the final exam, a minimum of 4.5 will be required in the grade of

this exam to do the average with the lab. sessions. The final exam grade will have a weight of

70% and will be weighted with 30% of the lab. sessions grade (as long as the minimums are

reached) to determine the final grade for the subject.

For the assessment activities, a place, date and time of review will be indicated allowing students

to review the activity with the lecturer. In this context, students may discuss the activity grade

awarded by the lecturers responsible for the subject. If students do not take part in this review,

no further opportunity will be made available

Final grade of the subject in case of failing the subject:

In case the student does not pass the subject, to determine the final grade that will appear in

the student'srecords, the following cases are considered:

1. The student has not taken any of the partial tests or the final exam. The final grade will be

'Not assessable'.

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 marks 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. The student has taken the final exam, but the grade is lower than the minimum necessary to weight with the re

The final grade will be the highest of the average of the partial tests and the final exam. taking into account the cc

5. The student has taken one or both of the partial exams and / or the final exam, but has not performed all the laboratory sessions or activities (or has failed either of these parts). The final grade of the subject will be that of the failed part (if it has been failed) or a zero (if it has not been done).

Excellent with honors.

The excelent with honors mark will be given on the basis or 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.

Observations

- Any other case not considered in this regulation, will be analyzed individually.

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The procedure for the validation of previous years (if applicable) will be established

at the beginning of the semester and will be published in the cv.

General remarks.

1. Notwithstanding otherdisciplinary measures deemed appropriate, and in accordance with the academic regulations in force, assessment activities will receive a zero whenever a student commits academic irregularities that may alter such assessment. Assessment activities graded in this way and by this procedure will not be re-assessable. If passing the assessment activity or activities in question is required to pass the subject, the awarding of a zero for disciplinary measures will also entail a direct fail for the subject, with no opportunity to re-assess thisin the same academic year. Irregularities contemplated in this procedure include, among others: the total or partial copying of a practical exercise, report, or any other evaluation activity, allowing others to copy, etc.

2. The dates for continuous evaluation and submission of papers will be published on the virtual campus and on the School website and may be subject to possible programming changes due to possible incidents. Any such modification will always be communicated to students through Campus Virtual, which is the usual communication platform between lecturers and students.

Bibliography

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

R. Pallás-Areny, "Instrumentos electrónicos básicos", Ed. Marcombo, 2006.

P.H. Sydenham, N.H. Hancok and R. Thorn, "Introduction to Measurement Science and Engineering",

John Wiley & Sons, 1989.

Software

LabVIEW, software to control electronic instrumentation.

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	321	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	321	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	322	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	323	Catalan	second semester	morning-mixed
(TE) Theory	320	Catalan	second semester	morning-mixed