Universitat Autònoma de Barcelona

2022/2023

Instrumentation I

Code: 102736
ECTS Credits: 6

Degree	Type	Year	Semester
2500895 Electronic Engineering for Telecommunication	OB	3	1

Contact

Name: Montserrat Nafría Maqueda
Email: montse.nafria@uab.cat

Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: No
Some groups entirely in Spanish: No

Teachers

Montserrat Nafría Maqueda
Marc Porti Pujal

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 transdu

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 c

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: diferential amplifiers and instrumentation amplifiers

Methodology

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.

Activities

Title	Hours	ECTS	Learning Outcomes
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 writting	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 writting and preparation of oral presentations	5	0.2	1, 2, 12, 10

Assessment

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, it will be considered that the corresponding case has not been done and, therefore, the student cannot pass the course.

- 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 mark of 4.5 in the average of all the case-related marks, to be able to do the average with the marks of examination and laboratory.

- Keep in mind that this part is not recoverable and, therefore, if this part is failed, the subject cannot be passed.

Laboratory lessons

- The realization of the laboratory classes is mandatory.

- To consider that a laboratory lecture has been done, it is mandatory the realization of the previous study (if needed), to attend the laboratory lecture and deliver the final report.

- 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.

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 thetwo 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.

- 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, and at least one partial exam.

- 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.

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.

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 insome of the partial exams themark 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 hasattended 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 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.

Remarks

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

General remarks

1. 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.

2. The dates of continuous evaluation and delivery of works will be published on the virtual campus and may be subject topossible 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.

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

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