

| Degree   | Type | Year |
|--|------|------|
| 2500001 Management of Smart and Sustainable Cities | OB   | 1    |

## Contact

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## Teaching groups languages

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

## Prerequisites

The knowledge required to complete the subject is basically the basic skills of mathematics and physics at the mi  
It is also recommended to have passed, or at least taken, the subjects of

## Objectives and Contextualisation

The subject focuses on sensors and the process of collecting information obtained from the physical world to be i

The specific objectives of the subject are:

- To know the characteristics and key aspects of conventional instrument
- Understand the operation of sensors and electronic conditioning.
- Understand the operation of the Analog-Digital and Digital-Analog conv
- To study how ICT technologies are involved in the application of instrun

## Competences

- Design platforms of management, integration of public and government services applying technologies and systems of sensorization, acquisition, processing and communication of data.
- Measure the technological infrastructure necessary to respond to the needs of cities, understanding the interactions between technological, social and operational aspects of cities.
- Prevent and solve problems, adapt to unforeseen situations and take decisions.

## Learning Outcomes

1. Be aware of existing sensors and understand the concept of detection in the broadest sense.
2. Be aware of the technology and systems /sensors offered by the market.
3. Describe the characteristics of instrumentation and detection systems, both analogue and digital.

4. Prevent and solve problems, adapt to unforeseen situations and take decisions.
5. Read and interpret technical documents, circuits and component-specification sheets.
6. Recognize current urban information-recruitment infrastructures.
7. Understand the scope of information gathering and its possibilities.

## Content

- Review of electronics fundamentals and programming.
- Concepts of instrumentation systems: Input / output, gain, filtering, sensitivity, resolution, quantification, coding, transduction, linearity.
- Sensors and transducers. Principles of operation, types and characteristics.
- Actuators and interaction with the environment.
- Control systems for electronic instrumentation systems. Loops and decision making.
- Integration of instrumentation, consumption and connectivity systems.

## Activities and Methodology

| Title                               | Hours | ECTS | Learning Outcomes |
|-------------------------------------|-------|------|-------------------|
| Type: Directed                      |       |      |                   |
| Practices                           | 12    | 0.48 | 1, 2, 3, 4, 5     |
| Problemes                           | 11    | 0.44 | 1, 2, 3, 7        |
| Theory                              | 22    | 0.88 | 1, 2, 3, 6, 7     |
| Type: Supervised                    |       |      |                   |
| Delivery of problems                | 4     | 0.16 | 3, 4, 5           |
| Team activities                     | 12    | 0.48 | 4, 5, 6           |
| Type: Autonomous                    |       |      |                   |
| Preparation of laboratory practices | 8     | 0.32 | 5                 |
| Preparation of reports              | 12    | 0.48 | 3, 5              |
| Problem resolution                  | 17    | 0.68 | 3, 4, 7           |
| Study of the contents               | 22    | 0.88 | 1, 2, 3, 7        |

The teaching methodology to follow is oriented to the learning of the subject by the student on a continuous basis. This process is based on the realization of three types of activities that will be developed throughout the course: classes of theory, classes of problems and practices of laboratory.

The teaching methodology and the evaluation may suffer some modifications depending on the restrictions imposed by health authorities.

Theory classes: The teacher will provide information about the knowledge of the subject and about strategies to acquire, expand and organize this knowledge. Active participation of students during these sessions will be encouraged, for example by discussing discussions at those points that have a higher conceptual load.

Problem classes: Students must participate actively to consolidate the acquired knowledge by solving, presenting and debating problems that are related to them.

Laboratory practices: Students will have to work in teams of two people to perform electronic assemblies, answer the questions related and solve the problems posed, putting into practice the knowledge worked in theory classes and problems. Then they will have to present them by means of written reports, where the use of English will be valued, the capacity for synthesis, and the reasonings and explanations requested.

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 |
|-----------------------|-----------|-------|------|-------------------|
| Exams                 | 30 %      | 6     | 0.24 | 1, 2, 3           |
| Individual deliveries | 20%       | 6     | 0.24 | 2, 3, 4, 6, 7     |
| Laboratori reports    | 30%       | 6     | 0.24 | 1, 4, 5           |
| Team activities       | 20 %      | 12    | 0.48 | 1, 2, 4, 5, 6, 7  |

The teaching methodology and the evaluation may suffer some modifications depending on the restrictions imposed by health authorities.

#### Continued avaluation

There will be two midterm exams throughout the semester. The average of these exams will constitute 50% of the mark of the subject.

Requirement: Minimum grade of 5 on average of the two partials.

Minimum grade of 3 in each of the two partials.

In the event that the average mark of the two parts is less than 5, the student must take the final synthesis exam in order to pass the course.

Throughout the semester, questions, problems and / or cases will be proposed in the form of activities and deliveries that the student will have to solve autonomously or in groups, inside or outside the classroom. The

average of the marks obtained in these activities and deliveries will constitute 20% in both cases of the final mark of the subject, and will only be taken into account for the continuous assessment, and not if the student has to go to the final exam of synthesis.

Requirement: Have delivered all the proposed activities and deliveries (those not delivered will be marked with a Not Presented, NP)

A minimum grade point average of 5 for these activities, and also for the deliveries.

Completion of all internships is mandatory. The mark obtained in the laboratory sessions will constitute 30% of the final mark of the subject. Failure to attend an internship will result in non-assessment of these, and therefore the student will be suspended from the subject. Only in case of proven justification, such as a visit or medical treatment impossible to change, death of relatives, etc .. the student will be able to recover the practice not realized presenting the corresponding justification. The method for retrieving it will depend on the availability of the internship teacher and the student in question.

Requirement: Minimum grade of 5 on average of all practices.

Attendance at all internships.

Recovery

In the event that the student does not pass the partial exams of the continuous assessment, the student may take the synthesis exam that will be held at the end of the semester and which will include all the contents of the subject. In this case, only the mark of the synthesis exam (50%) and the practice (30%) and grupal activities (20%) will be taken into account. Therefore, individual submissions will not be considered if the student does not pass the continuous assessment.

In the event that the student passes only the part of the group activities or the individual deliveries, he / she will be able to do an activity and / or delivery to recover this part of the continuous assessment. The activity and / or delivery will be proposed by the teacher in charge of them.

In the event that the student does not pass the internship, he / she will be permanently suspended from the subject. And he will have to take it again next year.

Final synthesis exam

It will be an exam in which all the contents of the subject will be evaluated. In order to pass the subject, a minimum final exam mark of 5 is required.

In order to obtain the final grade of the subject, the mark of the synthesis exam will be weighted with the mark of practices and grupal activities, with weights of 50% and 30% and 20%, respectively.

In the event that a student does not pass the continuous assessment or the synthesis exam, he / she will be suspended and will have to repeat the subject. If the student has passed the internship part, the grade will be saved for the next year. This will be the only note that will be kept from one year to the next.

Not evaluable

In the event that no delivery is made, no laboratory session is attended and no examination is taken, the corresponding grade will be a "Not Evaluable". In any other case, the "not presented" count as a 0 for the calculation of the weighted average, which will be a maximum of 4.5. That is, participation in some evaluable activity implies taking into account those "not presented" in other activities as zeros. For example, an absence in a lab session implies a grade of zero for that activity. And not doing so will mean suspending laboratory practices, and therefore the subject.

Suspended

The maximum mark that will appear in the file in case of not passing the subject for not fulfilling any of the minimum requirements demanded in the previous points, will be of 4,5 at the most.

Exam reviews and activities

All the activities carried out that compute for the grade of the subject can be reviewed to verify their score. The review will take place on a specific day and hour with the teachers corresponding to the activities reviewed, and that these will be indicated in advance through the virtual campus. After passing the review, these notes can not be reviewed again. If a revision can not be attended, the student must notify him in advance and another date will be found to be agreed between student and teacher / s. Only in case of a justified cause can the review be carried out after the announced date.

#### Repeaters

The students that repeat the subject will be able to validate the practices of laboratory, and the note of the previous year will be conserved to them. In order to validate the practices, the student will have to contact the professor responsible for the practices and request the validation. The practices will not be validated two years in a row, therefore, a student who attends this subject for the third time will have to carry out the practices again.

The rest of the marks of the subject can not be validated, and the student will have to repeat all the works and exams of the assessment, as a first-degree student.

#### Honor license plates

Honor matriculations will be awarded to those who obtain a grade greater than or equal to 9 in each part, up to 5% of those enrolled in descending order of final grade. At the discretion of the teaching staff, they may also be granted in other cases.

#### Copies and plagiarism

The copies refer to the evidence that the work or the examination has been done in part or in full without the author's intellectual contribution. This definition also includes tried attempts of copying in exams and deliveries of work and violations of the norms that ensure intellectual authorship.

The plagiarisms refer to the works and texts of other authors that make them happen as their own. They are a crime against intellectual property. To avoid plagiarism, quote the sources you use when writing the report for a job.

In accordance with the UAB regulations, copies or plagiarism or any attempt to alter the result of the assessment, either by themselves or by others - requiring copy, for example, implies a note of the corresponding part (theory, problems or practices ) of 0 and, in this case, a suspension of the subject, without this limiting the right to take action against those who have participated, both in the academic field and in the criminal.

#### Treatment of transversal spectacles

T04 (Transverse) - Prevent and solve problems, adapt to unforeseen situations and make decisions.

T04.00 - Preventing and solving problems, adapting to unforeseen situations and making decisions.

T05 (Transverse) - Critically evaluate the work done and demonstrate a spirit of overcoming.

T05.00 - Evaluate critically the work done and show a spirit of overcoming.

## Bibliography

- 'Instrumentación Electrónica', Pérez, Álvaro, Campo, Ferrero, Grillo. Editorial Thomson.

- 'Sensores y acondicionamiento de señal', Ramón Pallás Areny. Editorial Marcombo - Boixareu

## Software

The free access program of the Arduino platform will be used during the laboratory sessions.

## Language list

| Name                          | Group | Language | Semester        | Turn          |
|-------------------------------|-------|----------|-----------------|---------------|
| (PAUL) Classroom practices    | 611   | Catalan  | second semester | morning-mixed |
| (PAUL) Classroom practices    | 612   | Catalan  | second semester | morning-mixed |
| (PLAB) Practical laboratories | 611   | Catalan  | second semester | morning-mixed |
| (PLAB) Practical laboratories | 612   | Catalan  | second semester | morning-mixed |
| (PLAB) Practical laboratories | 613   | Catalan  | second semester | morning-mixed |
| (TE) Theory                   | 61    | Catalan  | second semester | morning-mixed |