

Distributed Systems

Code: 106945
ECTS Credits: 6

2025/2026

| Degree | Type | Year |
|--|------|------|
| Management of Smart and Sustainable Cities | 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 of information systems (Operating Systems, Networks, Services, ...) as well as its basic management and administration.

Objectives and Contextualisation

Develop skills in distributed computing systems for data processing in urban environments and in cloud computing services as computer infrastructure and data storage.

Learning Outcomes

1. CM18 (Competence) Provide innovative responses to the management needs of cities by means of information transmission, storage and processing technology.
2. KM24 (Knowledge) Describe the technological infrastructure necessary to respond to the needs of cities in an open way, understanding the interactions between technological, social and operational aspects of cities.
3. KM25 (Knowledge) Recognise the problems of information transmission and storage in the context of smart and sustainable cities.
4. SM22 (Skill) Develop cyber-physical systems for the management of smart cities.

Content

1. Introduction to computer systems: basic concepts of computing and operating systems.
2. Introduction to distributed systems: architecture, models, Internet of Things, errors, security.
3. Cloud Computing: data management of urban activities in the cloud.
4. Study of cases of cloud computing platforms: dynamic architectures, capacity, performance and cost.
5. Models and data analysis tools. Case study of distributed data management using mobile apps.

Activities and Methodology

| Title | Hours | ECTS | Learning Outcomes |
|-----------------------|-------|------|-------------------|
| Type: Directed | | | |
| Applied concepts | 11.5 | 0.46 | |
| Conceptual classrooms | 22.1 | 0.88 | |
| Labs | 11.5 | 0.46 | |
| Type: Autonomous | | | |
| Personal homework | 100 | 4 | |

The course has three main areas. Each of them follows a methodology appropriate to the type of teaching to be delivered:

Theoretical classes: The theoretical and conceptual aspects of the course.

Applied concepts: collaborative workgroup in the classroom with teacher support. The group will have to develop some topics assigned by the teacher.

Laboratory: sessions of groups of 2 students. These students will develop some exercises about specific items in the laboratory (80% attendance is required for these sessions).

To facilitate learning and interaction, it is recommended to have a digital device with a browser (preferably a laptop) to connect to the cloud and to run tests.

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 |
|------------------|-----------|-------|------|-------------------|
| Applied concepts | 20% | 0.4 | 0.02 | CM18, KM24, KM25 |
| General concepts | 48% | 4 | 0.16 | CM18, KM24, KM25 |
| Labs | 32% | 0.5 | 0.02 | KM24, KM25, SM22 |

Assessment:

Considering the practical nature of this subject, there is no single assessment option.

a) Assessment activities

The assessment of the student will be based on the evaluation of the different activities of the subject:

- General concepts: individual quiz of general concepts developed in the course.
- Applied concepts: individual quiz of applied concepts developed in the course.
- Labs: collaborative work and personal work developed during the sessions.

Important: Labs are not recoverable, if the grade is lower than 5, the student do not pass the course.

b) Calendar of evaluation activities

The evaluation activities will be continued and the delivery is through the Virtual Campus. The dates of continuous evaluation and work delivery will be published at virtual campus. The student will be informed in the virtual campus about possible changes since this is the information interchange platform between teachers and students. The schedule of the re-assesments process will be published in the exam schedule on the School's website.

c) Re-Assessment process

If the student don't pass the individual evaluation of general/applied concepts and if the Lab grade ≥ 5 points and that the weighted grade is ≥ 3.5 points, an additional exam will be programmed. The grades will compute the indicated percentage ≥ 5 points. Otherwise and after the recovery exam the student do not reach 5 points in each part, the student will not pass the course and as a final grade will have the equivalent weighted grade if ≤ 5 or 4.5 if the calculation of the grade weighted this note is greater ≥ 5 .

d) Review of qualifications

For each evaluation activity (except for automatic correction activities), a place, date and time of revision will be fixed. The student can review the activity with the teacher. If the student does not apply for this review, this activity will not be reviewed later.

e) Qualifications

Honor Grade. Honor grade is the decision of the subject staff. The regulations of the UAB indicate that HG can only be granted to students who have obtained a final grade ≥ 9.00 and only can be assigned up to 5% of HG of the total number of students enrolled. The award of MH is considered a merit and sign of excellence and is reserved for students who meet the requirements and not will be assigned automatically.

In the case of not attending any evaluation the student will have a 'No Available' as the final grade of the subject.

f) Irregularities by the student, copy and plagiarism

Without prejudice to other disciplinary measures and in accordance with current academic regulations,

irregularities committed by a student in an evaluable activity will have a grade = zero (0). These evaluation activities qualified with zero (0) will not be recoverable. If this activity is necessary to pass compulsory evaluation activities, this subject will be qualified as 'not pass" directly (without the opportunity to recover it in the same course).

These irregularities include, among others:

- the total or partial copy of a work, report, or any other evaluation activity;
- improper use of AI tools
- deliver a group work not done entirely by the members of the group (applied to all members, not only those who have not worked);
- presentas own materials prepared by a third party, even if they are translations or adaptations, and in general works with non original and exclusive elements of the student;
- have communication devices (such as mobile phones, smart watches, camera pens, etc.) accessible during individual evaluation quiz;
- talk with peers during individual quiz;
- copy or attempt to copy from other students during the evaluation quiz;
- use or attempt to use writings related to the subject during the individual quiz.

In future editions of this subject, students with this irregular actions can't compensate activities from previous year. In summary: the copy or plagiarism (or attempting) in any of the evaluation activities is equivalent to don't pass the subject & this action invalidate compensatory activities in subsequent courses.

Bibliography

Ebook UAB:(para acceder desde fuera de la UAB utilizar <http://xpv.uab.cat>) -BR recommended bibliography-

| | | |
|---|-----------------------------------|---------------------|
| (BR) <u>Big data, data mining, and machine learning : value creation for business leaders and practitioners / Jared Dean</u> | Dean, Jared, autor | Document electrònic |
| (BR) <u>Encyclopedia of cloud computing / editors, San Murugesan, Irena Bojanova</u> | -- | Document electrònic |
| <u>Fog and edge computing : principles and paradigms / edited by Rajkumar Buyya and Satish Narayana Srirama</u> | -- | Document electrònic |
| <u>Internet of things A to Z : technologies and applications / edited by Qusay F. Hassan</u> | -- | Document electrònic |
| (BR) <u>The internet of things & data analytics handbook / edited by Hwaiyu Geng</u> | -- | Document electrònic |
| <u>Professional Hadoop / Benoy Antony [i cinc més]</u> | Antony, Benoy, autor | Document electrònic |
| (BR) <u>Cloud Computing. Wiley. 2016. https://onlinelibrary.wiley.com/doi/book/10.1002/9781118821930</u> | San Murugesan, Irena Bojanova. | |

Software

Students will use VirtualBox (open source software) from their personal computers and a Browser to connect to the Department's Cloud and execute virtual machines. All the software used in the course is open source.

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 | 611 | Catalan/Spanish | first semester | afternoon |
| (PAUL) Classroom practices | 612 | Catalan/Spanish | first semester | afternoon |
| (PLAB) Practical laboratories | 612 | Catalan/Spanish | first semester | afternoon |
| (PLAB) Practical laboratories | 625 | Catalan/Spanish | first semester | afternoon |
| (PLAB) Practical laboratories | 628 | Catalan/Spanish | first semester | afternoon |
| (TE) Theory | 61 | Spanish | first semester | afternoon |