UAB
Universitat Autònoma de Barcelona

Management of Data-processing Infrastructures

Code: 104352
ECTS Credits: 6

2025/2026

Degree	Type	Year
Data Engineering	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

Recommendation: to passed the subjects of Fundamentals of Computer Science, Fundamentals of Programming, Computer Networks and the Internet.

Objectives and Contextualisation

The objective of this subject is to present the main characteristics of the infrastructures for the Big Data processing from three points of view: computation, storage and communication. The concepts and use cases of the main technologies used for massive data infraestructures will be presented, as well as some aspects related to the structure and location, cost, energy consumption, redundancy, scalability and availability.

Competences

- Conceive, design and implement efficient and secure data storage systems.
- Search, select and manage information and knowledge responsibly.
- Work cooperatively in complex and uncertain environments and with limited resources in a multidisciplinary context, assuming and respecting the role of the different members of the group.

Learning Outcomes

1. Deploy and manage data-processing infrastructures and the services associated with them.
2. Search, select and manage information and knowledge responsibly.
3. Work cooperatively in complex and uncertain environments and with limited resources in a multidisciplinary context, assuming and respecting the role of the different members of the group.

Content

1. Introduction to IT infrastructures for Big Data: Computing. Storage, Networks, Architecture (IoT, Edge, Cloud/Cluster/Distributed). Energy consumption and Cost.
2. Computing: Virtualization of processors and operating system. Hypervisors (KVM, HyperV, VWmare, VBox, ...), Containers (Docker and LXC) and serverless computing (Firecracker).
3. Storage: redundancy, scalability, high availability. NAS & DAS. Deployment and management
4. Networks: High throughput & very low latency networks. Software-defined networking. Linux Bridges/VXLAN/802.1Q. Deployment and Management.
5. Cluster and Cloud Infrastructures: Deployment (Manual, Terraform & Ansible), Administration and Management (services, security, monitoring, and tuning).

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Applied Concepts	11.5	0.46	2, 1
Conceptual Classroom	22.1	0.88	2, 1
Pràctices	11.5	0.46	1, 3
Type: Autonomous			
Individual study	100	4	2, 1

The subject contains three sections where each will have an appropiated methodology to the type of teaching:

Conceptual classroom: theoric and conceptual aspects of the contents will be explained.

Applied concepts: short works will be done on virtualized infrastructure in the covered topics that will be developed during the course.

Practices: group sessions of 2 students to resolve problems within the practices sessions (the student must have 80% attendance at these sessions).

To promote learning and interaction, it is recommended that students have a digital device (preferably a laptop) to access the subject's cloud resources and the assessment tests.

Use of AI: The use of Artificial Intelligence (AI) tools is permitted in this subject as part of student work's development, provided the final submission reflects their significant analytical and reflective contribution. The student must transparently identify AI-generated content, specify the tools used, and include a critical reflection on their role in the process and outcomes. Lack of proper disclosure will be treated as a violation of academic integrity, potentially resulting in grade penalties or stricter sanctions in serious cases.

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
Applied Concepts	25%	1.7	0.07	2, 1
General concepts	30%	1.7	0.07	2, 1
Labs	45%	1.5	0.06	1, 3

Given its practical nature, this course does not offer a single final assessment option.

a) Assessment Process and Activities

Student evaluation will be based on the following components:

- General Concepts: Automated individual tests (via UAB's Virtual Campus) covering theoretical content. The average score must be 5 or higher.
- Applied Concepts: Automated individual tests (via UAB's Virtual Campus) covering applied content. The average score must be 5 or higher.
- Practical Work: Evaluation of collaborative and individual work, conducted individually & exclusively through UAB's infrastructure. The average score must be 5 or higher.

b) Assessment Schedule

Evaluation is continuous, with submissions made through the Virtual Campus. Dates may change due to unforeseen circumstances, with updates communicated through the Virtual Campus, the official communication platform between instructors and students.

c) Re-assesment Process

Students who fail any component (general/applied concepts or practical work) but maintain an overall weighted score of $\geq$3 may re-assesment the failed component.

- Final grades only include components with $\geq$5. If any component remains below 5 after re-assesment, the course is failed, and the final grade will be the weighted average (if <5) or 4.5 (if weighted average is $\geq$5).
- Re-assesment dates will be published in the School's official exam calendar.

d) Grade Review

- General/Applied Concepts: As grading is automated, students may request a report on failed topics. Answers will not be reviewed unless demonstrable errors exist in the solutions.
- Practical Work: Students who fail may request a review of sections scored below 5.

e) Grading

- Honors Distinction (MH): Awarded to students with a final grade ≥9.00, following professors deliberation (maximum 5% of enrolled students). This distinction is not automatic and considers both academic excellence and additional merits.
- No Show: Missing assessments results in a "Not Evaluated" mark.

f) Academic Irregularities & Plagiarism

Any irregularity (plagiarism, unauthorized AI use in assessments, prohibited devices, etc.) will result in a 0 for the affected component, with no re-assesment option. If the component is mandatory to pass, the course will be failed immediately.
In future course editions, students committing irregularities will not have any assessment components recognized.

h) Evaluation of Repeating Students

Students who previously passed practical work (grade ≥5) may request validation for the current academic year only.

Bibliography

IT Infrastructure architecture : infrastructure building blocks and concepts
Laan, Sjaak, 2017/Third edition

Big Data Made Easy : A Working Guide to the Complete Hadoop Toolset
Frampton, Mike, 2015/1st ed.

(BR) Building a future-proof cloud infrastructure : a unified architecture for network, security and storage services
Gai, Silvano, et. al. 2020

Encyclopedia of cloud computing
Murugesan, San, 2015/1st ed.

Fog and edge computing : principles and paradigms
Buyya, Rajkumar, 2019/1st edition

Big data for dummies
Hurwitz, Judith.; Hurwitz, Judith.2013/ 1st ed.

(BR) Cloud computing : principles and paradigms
Buyya, Rajkumar, 1970-; Broberg, James.; Gościński, Andrzej. 2011

(BR) IT Architecture for dummies
Hausman, Kalani Kirk, autor; Cook, Susan L., 2011

(BR) Cloud computing : Web-based dynamic IT Services
Baun, Christian, autor; Kunze, Marcel, autor; Nimis, Jens, autor; Tai, Stefan, 2011

(BR) Learn Ansible: Automate cloud, security, and network infrastructure using Ansible 2.x
McKendrick, Russ 2018

Scheduling of large-scale virtualized infrastructures: toward cooperative management
Quesnel , Flavien 2014

Big data
LeClerc, Benoit, editor.; Cale, Jesse, editor. 2020

Software

Students must use VitualBox (openSource software) from their personal computers and a Browser to connect to the Department's Cloud and run virtual machines. All the software used in the course is under a open source license.

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
(PLAB) Practical laboratories	811	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	812	Catalan/Spanish	first semester	morning-mixed
(PLAB) Practical laboratories	813	Catalan/Spanish	first semester	afternoon
(TE) Theory	81	Catalan	first semester	afternoon