

1. BASIC INFORMATION

Course	Distributed Systems Computing
Degree program	Masters in Big Data Analytics
School	Escuela de Arquitectura, Ingeniería y Diseño
Year	1
ECTS	6
Credit type	Compusory
Language(s)	English
Delivery mode	Face-to-face / Online
Semester	1
Academic year	2025-2026
Coordinating professor	Oscar Marbán Gallego

2. PRESENTATION

This compulsory 6 ECTS course aims to provide students with the fundamental concepts necessary to understand the analysis and processing of information located in distributed environments.

The dynamics of the big data processing sector face challenges related to data distribution, which renders centralized information manipulation technologies and techniques insufficient and incomplete. This course will analyze the architectures and platforms used for distributed information management.

3. LEARNING OUTCOMES

Knowledge

CON04: Understand the fundamentals of distributed processing and storage of large volumes of data.

Skills

HAB01: Apply the knowledge acquired about distributed/cloud systems in the development and implementation of data analysis systems.

HAB02: Apply the technical fundamentals of high-performance distributed systems, as well as their development environments and both SQL and NoSQL databases.

HAB05: Design a data extraction, transformation, and loading (ETL) process using parallel processing and scalable resources.

Competences

CP01: Analyze and discuss the market players, companies, and technologies involved in the field of big data analytics within distributed infrastructures.

CP02: Select and configure appropriate cloud computing services to meet the requirements of big data analytics.

CP03: Design and implement physical infrastructures for processing large volumes of distributed data.

4. CONTENT

La materia está organizada en unidades de aprendizaje, las cuales, a su vez, están divididas en temas

1. Diseño e Instalación de Clusters de Alto Rendimiento
 - Fundamentos de Clusters de Alto Rendimiento
 - Arquitectura y Componentes de un Cluster
 - Paradigma de programación paralela
2. Instalación y Administración de Sistemas de Almacenamiento y Procesamiento Distribuido (Hadoop, Spark)
 - Sistemas de Almacenamiento Distribuido
 - Sistemas de Procesamiento Distribuido
 - Administración de Sistemas Distribuidos
 - Integración y Uso de Sistemas Distribuidos
3. Seguridad en Sistemas Distribuidos
 - Principios Básicos de Seguridad
 - Seguridad en la Comunicación
 - Control de Acceso y Gestión de Identidades
 - Seguridad en el Almacenamiento de Datos
 - Monitorización y Respuesta a Incidentes

5. TEACHING-LEARNING METHODOLOGIES

The following types of teaching and learning methodologies will be applied:

- MD1: Face-to-face lectures or, where applicable, through the virtual campus
- MD2: Cooperative Learning
- MD3: Problem-Based Learning
- MD4: Group Research (a) and/or (b) Group Problem Solving
- MD6: Simulation Environments and Field Experiences

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Learning activity	Number of hours
Masterclasses	20
Individual Activities	35
Integrative Activities	15
Lab activities	10
Autonomous work	68
Exams and tests	2
TOTAL	150

Virtual mode:

Learning activity	Number of hours
Masterclasses	20
Individual Activities	30
Integrative Activities	20
Lab activities	16
Autonomous work	60
Exams and tests	4
TOTAL	150

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based mode:

Assessment system	Weight
SE1: Exams	50%
SE2: Report writing	30%
SE3: Practical Use Cases	20%

Virtual mode:

Assessment system	Weight
SE1: Exams	60%

SE2: Report writing	25%
SE3: Practical Use Cases	15%

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

To pass the course in the first exam period, you must obtain a final course grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of 4.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

7.2. Second exam period

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 4.0 in the final exam in order for it to count towards the final grade along with all the grades corresponding to the other activities.

The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

Assessable activities	Deadline
Activity 1	Week 5
Activity 2	Week 7
Activity 3	Week 9
Activity 4	Week 11
Ordinary call	At the end of subject
Extraordinary call	First weekend of September

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any changes as and when appropriate.

9. BIBLIOGRAPHY

The main reference work for this subject is:

- Cope, R. & Erl, T. (2015). Cloud Computing Design Patterns. India. Pearson. Fox, A. & Patterson, D. (2014). Engineering Software as a Service: An Agile Approach Using Cloud Computing. Strawberry Canyon LLC.
- White, T. (2015). Hadoop: The Definitive Guide. O'Reilly.
- Odersky, M., Spoon, L. & Venners, B. (2008). Programming in Scala. Ed. Artima. Odersky, M. (2010). Scala by Example. Programming Method Laboratory, Switzerland: EPFL. Wampler, D. & Payne, A. (2009). Programming Scala. Ed. O'Reilly.
- Karau, H., Konwinski, A., Wendell, P. & Zaharia, M. (2015). Learning Spark. O'Reilly.

10. EDUCATIONAL GUIDANCE, DIVERSITY AND INCLUSION UNIT

From the Educational Guidance, Diversity and Inclusion Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students' inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.

From this unit we offer to our students:

1. Accompaniment and follow-up by mean of counselling and personalized plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunity for all students.
3. We offer students different extracurricular resources to develop different competences that will encourage their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us at:

orientacioneducativa@universidadeuropea.es

11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the “surveys” section on virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.