

## 30238 - Data Centers

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 30238 - Data Centers

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 439 - Bachelor's Degree in Informatics Engineering

**ECTS:** 6.0

**Year:** 4

**Semester:** First semester

**Subject type:**

**Module:**

### 1. General information

Data centers (DCs) are infrastructures for computing, storage, connectivity, power supply and air conditioning.

In their conception and operation, they take advantage of economies of scale to offer ICT services at excellent value for money, proliferating in all types of countries and economies.

The tasks of designing, building and operating a DC, whether enterprise, hyperscale or supercomputing, are presented. Several disciplines will be considered (building, energy sources, cooling, servers, storage, connectivity, ICT load management, etc.), allowing the student to become part of a multidisciplinary design or management team of a DC.

### 2. Learning results

- Knowledge of the existence of standards in the design of data centers, relative to building, cooling, cabling, power supply, energy backup and service guarantee.
- Knowledge of the business models around a data center and the importance of quality assurance and security. Knowledge of technical requirements and business continuity.
- Understand the primary role of energy efficiency in the design and operation of a data center. Awareness of the impact on the environment.
- Understanding of the computation, networking, secondary and tertiary storage components of a data center, its structure, scaling and management. Knowledge of secondary storage alternatives and their advantages and disadvantages (DAS, NAS, SAN, etc.). Knowledge of the design of backup policies.
- Knowledge of interconnection strategies between servers, racks and external internet connections, as well as their scaling.
- Knowledge of the physical fundamentals and practical application of air management and cooling methods for data centers.

### 3. Syllabus

- History and motivation
- Computing servers
  - Scalability, benchmarking and RAS
  - Energy efficiency
- Data Center (DC) Basics
  - Electric power: distribution, PDU, UPS, efficiency
  - PUE, sPUE and cost/benefit model of a DC
  - Types, availability and design criteria
  - Organizations and standards, TIERS
- Communications networks

- Secondary and tertiary storage
- Cooling
  - DC cooling control: psychrometrics; cooling production and humidity control

#### **4. Academic activities**

- Lectures.
- Problem solving classes.
- Assisted laboratory practices.
- Visits to real facilities.
- Personal study and work to prepare for the exam and complete the assignments.

#### **5. Assessment system**

The assessment will consist of two parts:

1. Exercises and assignments on theoretical and practical contents (50%)
2. Examination (50%)

The subject is passed with an overall grade of 5 points out of 10, with a minimum of 4 points out of 10 in each of the two parts. In case of not reaching the minimum grade in any of the parts, the maximum overall grade will be 4.5 points out of 10.

Both calls follow the same rules.

#### **6. Sustainable Development Goals**

- 7 - Affordable and Clean Energy
- 9 - Industry, Innovation and Infrastructure