COURSE DATA

DATA SUBJECT

Code: 36435
Name: Data storage infrastructure
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1406 - Degree in Data Science	Escola Tècnica Superior d'Enginyeria	2	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1406 - Degree in Data Science	Computer Science	COMPULSORY

COORDINATION

REAÑO GONZALEZ CARLOS

SUMMARY

Data Storage Infrastructure is taught as a component of Computing in the first semester of the second year of the Degree in Data Science.

The course is based on programming knowledge previously acquired on Programming Fundamentals and Data Structures and Algorithms and serves as the basis for later courses such as Networks and Security, Parallel Programming and Big Data.

Students learn about operating systems, how these systems rely on the computer's physical components, what services they offer, and how they are administered. Specifically, the various levels of local storage are studied, beginning with storage devices and ending with local file systems. Also addressed are virtualization techniques for resources and the hardware used in Big Data applications.

The theory classes will be taught in Spanish. The language for the practical and laboratory classes will be specified in the course guidelines available on the website for this degree.

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PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

Students are recommended to have passed the courses on Programming Fundamentals and Data Structures and Algorithms.

COMPETENCES / LEARNING OUTCOMES

1406 - Degree in Data Science

(CB4) Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.

(CE04) To know and use the different models of data storage and database management systems using programming languages for the definition, query and handling of data.

(CE08) Ability to understand, select and use the infrastructure and the techniques used to handle mass data, according to criteria of efficiency, scalability, security, error tolerance and adaptation to the production environment.

(CG01) Knowledge of basic subjects and technologies that enable students to learn new methods and technologies, and to provide them with versatility to adapt to new situations.

(CG04) Ability to work in a multidisciplinary group in a multilingual environment and to communicate, orally and in writing, knowledge, procedures, results and ideas related to data science.

(CT03) Ability to defend your own work with rigor and arguments and to expose it in an adequate and accurate way with the use of the necessary means.

(CT05) Ability to evaluate the advantages and disadvantages of different methodological and / or technological alternatives in different fields of application.

Students must have acquired knowledge and understanding in a specific field of study, on the basis of general secondary education and at a level that includes mainly knowledge drawn from advanced textbooks, but also some cutting-edge knowledge in their field of study.

DESCRIPTION OF CONTENTS

Concept of operating system

1. Introduction to operating systems

Concept of operating systemProcesses and threads
Memory management
I/O Management
File systems
Linux OS administration

2. Local storage management

Physical devices
Disk scheduling
RAID
Logical volumes
Block cache
Advanced file systems

3. Virtualization

Virtualization types and techniques
Virtual machines
Containers
Operating systems for virtualization

4. Hardware for Big Data

Servers for data processing
Specialized storage systems
Specialized backup systems

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Laboratory	20,00
Classroom practices	10,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00

Individual or group project	10,00
Independent study and work	30,00
Preparation of lessons	30,00
Preparation for assessment activities	20,00
Resolution of case studies	0,00
Total hours	**90,00**

TEACHING METHODOLOGY

The various teaching activities for this course are:

- Theoretical activities. The topics taught in the theory classes will provide a global and integrating vision, analyze the key and most complex aspects in detail, and encourage student participation (competences CB1, CB4, CG1, CT5, CE4, CE8).

- Practical activities. These activities will complement the theoretical activities. The basic concepts will be applied and expanded with the knowledge and experience students acquire by completing their assignments. These activities include solutions to problems and questions discussed in the classroom, discussion sessions, problem solving and other exercises previously worked on by the students, laboratory practice, oral presentations, conferences and scheduled individual or group tutoring sessions (competences CB1, CB4, CG1, CG4, CT3, CT5, CE4, CE8).

- Individual work. This includes completion (outside the classroom) of monographs, literature research, questions, problems, and studying for classes and exams. These are done individually and are intended to promote autonomous learning (competences CB1, CG1, CT3, CT5, CE4, CE8).

- Small-group work. Group work completed outside the classroom in small groups of 2-4 students comprising assignments, questions and problems. This type of activity complements individual activities and fosters teamwork (competences CB1, CB4, CG4, CT3, CT5, CE4, CE8).

EVALUATION

The course can be evaluated in two different ways, one giving more weight to the classroom activities and the other giving more weight to the final exam. Each student will receive the higher of the two as the final grade.

The evaluation of the course is carried out in the first examination sitting as follows:

+ (TP) Evaluation of theory and problems. This part has a weight of 75% of the final grade and it is

necessary to reach a 4.5 out of 10 to be able to pass the course.
- (SE3) Continuous Assessment (CA), based on the participation and the degree of involvement in the teaching-learning process, taking into account the regular attendance to the scheduled classroom activities and the resolution of questions, problems and proposed work, both individually and in groups. This part is not recoverable. (CB1, CB4, CG1, CG4, CT3, CT5, CE4, CE8)
- (SE1) Individual objective tests, consisting of several examinations or tests of knowledge, which include theoretical and practical questions and problems. The tests are taken during the first half of the four-month period (called T1), during the second half of the four-month period (T2) and outside school hours during the exam period (called T3). Each of these tests covers all of the course content taught up to the time of the exam. (CB1, CG1, CT5, CE4, CE8)
- The TP grade is calculated as follows: TP = 0,2*AC + 0,1*T1 + 0,25*T2 + 0,45*T3

+ (SE2) Evaluation of laboratory practical activities (L) based on the achievement of objectives in the laboratory sessions. (CB1, CB4, CG1, CG4, CT3, CT5, CE4, CE8)
- These activities are carried out in pairs, the weight is 25% of the final grade and it is necessary to reach a 4.5 out of 10 to be able to pass the course. All laboratory sessions have the same weight on the final grade. In case of not being able to attend a session, the student can hand in the corresponding work to the laboratory professor. The delivery must be done in person, during office hours, and the student must be prepared to answer questions about the performance of the practical and to make parts on the spot (with small changes). This type of delivery must be done before any laboratory group has done the practical and has a penalty of 20%.

The grade for the course is made up, in the case of continuous assessment, as the sum of the previous parts as follows:
- If TP is less than 4.5 or L is less than 4.5: Final_grade = lowest grade TP or L
- In another case: Final_grade = 0.75*TP + 0.25*L

In case of not having passed the course following the continuous assessment (or in case the grade calculated in this second way would be more favorable for the student), the T3 assessment test is the final exam of the course and TP is calculated as follows
- TP = 0,2*CA+0,8*T3

The final grade is calculated in the same way as for the continuous assessment.

In the second examination sitting, the course is evaluated in the same way as in the first one, with the following exceptions

- A delivery period for submitting lab assignments will be open, with a 30% penalty. The assignments will not be conducted in the laboratory and must be submitted in person during the laboratory instructor's office hours. The deadline for submission is the last day of the laboratory instructor's office hours before the second call. Students must be prepared to answer questions about the assignment and complete parts of it on the spot (with minor changes).
- The exam of the second examination sitting replaces the T3 test.
- The CA mark is the same as in the first examination sitting.

To apply for an advanced examination sitting, students must have previously taken the course and obtained the minimum mark required to evaluate the practical laboratory activities (L). This procedure is intended to reconcile a student's right to an advanced examination sitting with the teaching methodology and evaluation criteria for this course.

Copying or plagiarism or any other fraudulent practice in any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA (ACGUV 123/2020).

In all cases the evaluation system will be governed by the University of Valencia¿s regulations on grading and assessment for bachelor's degrees and master's degrees, which is available at:

http://www.uv.es/graus/normatives/2017_108_Reglament_avaluacio_qualificacio.pdf

REFERENCES

- "Operating System Concepts". Abraham Silberschatz, Peter Baer Galvin y Greg Gagne. John Wiley & Sons.
- "Operating Systems" [Recurs electrònic]. William Stallings. Pearson Education
- "Sistemas Operativos". William Stallings. Prentice Hall.
- "Sistemas Operativos. Una visión aplicada". Jesús Carretero, Félix García, Pedro de Miguel y F. Pérez. McGraw-Hill.
- "Fundamentos de Sistemas Operativos". Abraham Silberschatz, Peter Baer Galvin y Greg Gagne. John Wiley & Sons.
- "Unix and Linux System Administration Handbook". Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley. Prentice Hall.