

**COURSE DATA****DATA SUBJECT****Code:** 36444**Name:** Data-based logistics**Cycle:** Undergraduate Studies**ECTS Credits:** 4.5**Academic year:** 2025-26**STUDY (S)**

| Degree | Center | Acad. year | Period |
|-------------------------------|--------------------------------------|------------|----------------|
| 1406 - Degree in Data Science | Escola Tècnica Superior d'Enginyeria | 4 | Second quarter |

SUBJECT-MATTER

| Degree | Subject-matter | Character |
|-------------------------------|-----------------------|-----------|
| 1406 - Degree in Data Science | Data-driven Logistics | ELECTIVES |

COORDINATION

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SUMMARY

Data-based Logistics is a required subject in the second semester of the fourth year of the Degree in Data Science with a course load of 4.5 ECTS credits.

Logistics includes the organisation, movement and storage of materials. Today's economy, with an ever-increasing volume of data and increasingly competitive markets, demands more efficient logistics management. Companies have to solve the problem of having the right people and the right materials at the right time and in the right place. Logistics activities include inventory management, location problems and distribution and transport problems. Inventory management is a critical aspect of resource management to meet the objectives of good customer service and efficient production, keeping inventories at a minimum level, which suggests developing appropriate models to forecast the availability of materials in the face of unforeseen circumstances. The transport and distribution of goods, both own and third party, as well as the location of resources, has to cover the great variability of real situations in which these problems arise. The related models and the most efficient tools to solve all these problems will be studied. The aim is to provide students with a set of methods and models that will enable them to face the different situations that may arise in a public and/or business organization.

The theory classes will be imparted in Spanish and the practical and laboratory classes will be imparted in English. as stated in the course description available on the website of the degree course.

PREVIOUS KNOWLEDGE



RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

Without any prerequisites for enrolment, it is recommended to review the knowledge and contents of the first-year subjects: Optimisation, Data Structures and Algorithms and Programming fundamentals. Without any prerequisites for enrolment, it is recommended to review the knowledge and contents of the first-year subjects: Optimisation, Data Structures and Algorithms and Programming fundamentals.

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.

(CB5) Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.

(CE05) To understand the most relevant fields of application of data science and understand how data science is used to base and perform decision-making based on data

(CE13) To know how to design, apply and evaluate data science algorithms for the resolution of complex problems.

(CG03) Capability to elaborate models, calculations, reports, to plan tasks and other works analogous to the specific field of data science.

(CG05) Analysis and synthesis capability in the preparation of reports and in the defence of ideas.

(CG06) Ability to access and manage information in different formats for subsequent analysis in order to obtain knowledge from data.

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

Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.

DESCRIPTION OF CONTENTS

1.1. Definition of Logistics.

1.2. Supply chain.



1. Logistics and supply chain

- 1.1. Definition of Logistics.
- 1.3. Optimization models.

2. Linear and Integer Programming

- 2.1. Linear Programming Models. Simplex Method.
- 2.2. Integer Programming Models.
- 2.3. Branch and bound algorithms.
- 2.4. AMPL models.

3. Heuristic and metaheuristic algorithms

- 3.1. Constructive heuristics.
- 3.2. Local search.
- 3.3. Metaheuristics.

4. Multi-Objective problems

- 4.1. Goal programming.
- 4.2. Multi-Objective model.

5. Supply Chain

- 5.1 Production planning
- 5.2 Transportation and network flows

WORKLOAD

PRESENCIAL ACTIVITIES

| Activity | Hours |
|---------------------|--------------|
| Theory | 24,00 |
| Laboratory | 15,00 |
| Classroom practices | 6,00 |
| Total hours | 45,00 |

NON PRESENCIAL ACTIVITIES

| Activity | Hours |
|--------------------------------|-------|
| Attendance at other activities | 0,00 |



| | |
|---------------------------------------|--------------|
| Individual or group project | 28,00 |
| Independent study and work | 10,00 |
| Preparation of lessons | 14,50 |
| Preparation for assessment activities | 10,00 |
| Resolution of case studies | 5,00 |
| Total hours | 67,50 |

TEACHING METHODOLOGY

MD1 - Theoretical activities. Expository development of the subject (CG01) with student participation in the resolution of specific questions (CB2, CB4, CT03).

In the face-to-face theoretical activities, the topics of the subject will be developed, encouraging, at all times, the participation of students (CT03).

MD2 - Practical activities. Learning through problem solving, exercises and case studies through which competences on the different aspects of the subject are acquired (CB2, CG03, CE13).

Theoretical explanations are complemented with practical activities with the aim of applying the basic concepts and acquiring a working knowledge of logistics problem-solving methods.

MD4 - Computer classroom work. Learning through activities developed in small groups and carried out in computer classrooms (CB2, CB4, CB5, CG03, CT05, CE05, CE13).

In addition to face-to-face activities, students will have to carry out work outside the classroom, related to class practices, as well as class and exam preparation (CG03). Some of these tasks will be carried out individually, to promote autonomous work, but there will also be work that will require the participation of small groups of students (2-3) to promote the ability to integrate into working groups (CG03, CT05).

The Virtual Classroom of the Universitat de València will be used as a support for communication with students. Through it, students will have access to the didactic material used in class, as well as the problems and exercises to be solved.

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EVALUATION

The course will be evaluated according to 3 types of aspects:

SE1 - Objective test, consisting of one or several exams that include both theoretical-practical questions and problems.

SE2 - Evaluation of practical activities based on the elaboration of homework projects.

The evaluation of the knowledge and skills attained by the will have two components:

1.- Project: algorithm coding - 30% of the final grade.
(CB2, CB4, CB5, CG03, CG05, CG06, CE05, CE13).

2.- Written final exam: math models - 70% of the grade.
(CB2, CB4, CB5, CG03, CG05, CT05, CE05, CE13).

In order to pass the course, it is required to pass the exam (i.e., to get a minimum grade of 5 over 10 in the final exam). The activities in part 1 (project) are considered not-recoverable, that is, they cannot be evaluated by an exam. This grade will be kept for the whole academic year.

Copying or plagiarism of 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 (ACGVV 123/2020).

REFERENCES

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