

## 30113 - Operative Research

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 30113 - Operative Research

**Faculty / School:** 175 - Escuela Universitaria Politécnica de La Almunia  
179 - Centro Universitario de la Defensa - Zaragoza

**Degree:** 425 - Bachelor's Degree in Industrial Organisational Engineering  
563 - Bachelor's Degree in Industrial Organisational Engineering

**ECTS:** 6.0

**Year:** 2

**Semester:** 563 - Second semester  
425 - First semester

**Subject type:** Compulsory

**Module:**

### 1. General information

The modeling of real problems and their resolution by means of optimization techniques introduces the student to decision making. The aim of this subject is for the student to be able to identify, analyze, formulate and solve problems of decision related to organization and management. It will be essential for the student to acquire the ability to determine the best strategy for action.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), (SDG-1, SDG-4, SDG-8 and SDG-12) in such a way that the acquisition of the learning results of the subject provides training and knowledge, skills and competencies to contribute to some extent to their achievement.

### 2. Learning results

1. Identify and formulate operational research models from the verbal description of the real system.
2. Manage the mathematical foundations necessary for solving optimization problems.
3. Justify the model chosen and the solving technique employed given an optimization problem.
4. Use computer programs to solve the proposed models.
5. Prepare a report that presents the model and the resolution technique, analyzes the results, and proposes recommendations, in understandable language for decisionmaking in management and industrial organization processes

### 3. Syllabus

#### Defense Profile

1. Methodology of Operations Research.
2. Linear programming: modeling, resolution methods, duality and sensitivity analysis.
3. Multi-criteria decision techniques.
4. Graph theory and flow models in networks.
5. Decision analysis in environments of uncertainty and risk.
6. Game theory.

#### Company Profile

1. Methodology of Operations Research.
2. Linear programming: modeling, resolution methods, duality and sensitivity analysis.
3. Graph theory and flow models in networks.
4. Decision analysis in environments of uncertainty and risk.
5. Multi-criteria decision techniques.
6. Game theory.

### 4. Academic activities

#### Defense Profile

- **Lectures:** sessions to develop the content of the subject.
- **Practical problem solving sessions:** solving problems of application of the contents, both by the teacher and problems to be done by the students in the classroom.
- **Teamwork:** Problem solving by students, both inside and outside the classroom.
- **Computer-based practice:** activities in which specific software is used to solve problems.
- **Individual study and work.**
- **Tutoring.**

### Company Profile

The subject is structured with 4 hours of face-to-face classes during the 15 weeks of the term. All hours are taught in the computer classroom. Theoretical concepts are taught and reinforced with practical work through the use of statistical analysis programs.

Personal work: 60 hours

autonomous work

## 5. Assessment system

### Defense Profile

#### FIRST CALL

**Continuous** assessment:

1. **Theoretical-practical test** of topics 1, 2 and 3.
2. **Theoretical-practical test** of topics 5, 6 and 7.
3. **Applied test** in which the use of the specific software of the subject will be evaluated.
4. **Team work** on the application of the contents of the subject. The following must be submitted for each paper from a report of the results by means of a written document.
5. Individual or group **deliverables** on activities proposed by the faculty throughout the term

#### Global test:

Students who do not pass the subject by continuous assessment or who would like to improve their grade, will have the right to take this global test prevailing, in any case, the best of the grades obtained. Theoretical and practical test of 100% of the subject.

#### SECOND CALL

#### Global test:

Students who do not pass the subject in the first call may sit for this exam, which will consist of a written exam on theoretical-practical questions and problem solving related to 100% of the subject.

**In order to pass the subject, in any of the cases, the student must obtain a final grade higher or equal to 5.**

### ASSESSMENT CRITERIA

They are established based on the learning results and are provided to students for each instrument during the term. The maximum grade for a problem will be obtained only if the correct solution is reached with a complete reasoning based on the methods or algorithms studied during the term.

#### INSTRUMENTS AND LEARNING RESULTS (RA)

Instrument	Weighting	RA-1	RA-2	RA-3	RA-4	RA-5
Theoretical test	35%	x	x	x		
practice 1						
Theoretical and practical test 2	35%	x	x	x		
Applied test	10%			x	x	
Teamwork	15%	x	x	x	x	x
Deliverables	5%	x	x	x	x	

### Company Profile

#### Continuous assessment system

Written tests: two written tests will be given throughout the subject. They will deal with theoretical and/or practical aspects of the subject. Its weight in the grade is 80%. The learning results to which they are related are 1, 2, 3, 4 and 5.

Participative tests: throughout the term the student will perform 4 participatory controls valued at 5% of the final grade, which will consist of the completion of practical exercises or evaluative questionnaires scheduled through the virtual platform Moodle. The learning results to which they are related are 1, 2, 3, 3, 4 and 5.

In both types of tests, the following will be evaluated:

- understanding of the mathematical concepts used to solve problems
- the use of efficient strategies and procedures in its resolution
- clear and detailed explanations
- the absence of mathematical errors in development and solutions
- correct use of terminology and notation
- clear, orderly and organized exposition

**Global assessment.**

Students who have not passed the subject with the continuous assessment system, must take a written test of obligatory character equivalent to the written tests and the participatory controls described in the point, whose weight in the final grade will be 100%.