



DEGREE CURRICULUM

INDUSTRIAL ORGANIZATION II

Coordination: MILLAN GOMEZ, JOSE SEBASTIAN

Academic year 2023-24

Subject's general information

Subject name	INDUSTRIAL ORGANIZATION II			
Code	14531			
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION / UNDEFINED			
Typology	Degree	Course	Character	Modality
	Master's Degree in Industrial Engineering	2	COMPULSORY	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRAULA		TEORIA
	Number of credits	3		3
	Number of groups	1		1
Coordination	MILLAN GOMEZ, JOSE SEBASTIAN			
Department	ECONOMICS AND BUSINESS			
Teaching load distribution between lectures and independent student work	Lectures: 60 hours. Student work: 90 hours.			
Important information on data processing	Consult this link for more information.			
Language	Spanish. Learning materials in English, Catalan and Spanish.			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
MILLAN GOMEZ, JOSE SEBASTIAN	jose.millan@udl.cat	0	
MILLAN GOMEZ, JOSE SEBASTIAN	jose.millan@udl.cat	6	
NOGUES AYMAMI, MIQUEL	miquel.nogues@udl.cat	0	

Subject's extra information

To follow this subject properly previous knowledge on Calculus, Statistics and Economic Theory of the Firm is recommended.

Each management science model being is introduced by means of a problem-scenario approach.

In order to reach the stated goals this subject requires a continuous work all over the semester.

Critical thinking and abstract reasoning abilities are needed.

Additional learning materials are available at Campus Virtual, <http://cv.udl.cat>:

- Problems.
- Past years solved tests.
- Papers and publications.

All news about the subject are announced at Campus Virtual, so it is recommended to visit it frequently.

Learning objectives

General objective:

To apply a scientific approach to solving management problems in order to help managers make better decisions.

Instrumental objectives:

- To know how to use operations research to set and solve management problems.
- To distinguish between deterministic and stochastic models.
- To know the principals of Linear Programming and how to apply them to management problems.
- To know the principals of Decision Theory.
- To know the principals of Multiobjective Programming and how to apply them to management problems.
- To know the principals of Dynamic Programming and how to apply them to management problems.

Competences

Basic competences set in Royal decree 861/2010 and Order CIN/311/2009

- CB4 To be able to communicate conclusions –and knowledge and reasons that support them– to either specialized or not specialised publics in a clear way and without ambiguities
- CG10 To make strategic planning and apply it to construction, production and quality systems and to environmental management.
- CG11 To manage both technically and economically projects, installations, plants, companies and technological centres.

- CG12 To be able to execute functions of general management, technical management and management of R&D projects in plants, companies and technological centres.

General competences set in ORDEN CIN/311/2009 and EPS criteri

- CG3 Capacity to convey information, ideas, problems and solutions both to a specialised and no specialised public.

Specific competences set in ORDEN CIN/311/2009

- CE13 Knowledge on methods and techniques of transportation and industrial maintenance services.
- CE20 Knowledge of information systems for management, industrial organisation, production and logistical systems and management of quality systems.
- CE23 Capacity for research development and technological innovation management.

Subject contents

Course syllabus.

Lesson 1: Decision making and problem solving.

- 1.1 Quantitative analysis and decision making.
- 1.2 Costs, returns and benefits models.
- 1.3 Example: Break-even analysys.

Lesson2 : Introduction to linear programming.

- 2.1. Problem statement.
- 2.2 Graphical procedure.
- 2.3 Sensitivity analysis.
- 2.4 Duality.
- 2.5 Simplex.

Lesson 3 Linear programming applications.

- 3.1 Production planning.
- 3.2 Portfolio selection.
- 3.3 Blending models.

Lesson 4 Integer programming and non-linear programming.

- 4.1 Knapsack problem.
- 4.2 Personnel allocation.
- 4.3 Mean-Variance portfolio model.

Lesson 5 Network optimization.

- 5.1 Transportation, transshipment and assignment models.
- 5.2 Shortest route, minimal tree spam and maximal flow.

Lesson 6 Decision theory.

- 6.1 Problem formulation.
- 6.2 Pay-off matrix.
- 6.3 Decision trees.
- 6.4 Certainty, risk and uncertainty.
- 6.5 Decision making with uncertainty: Game Theory criteria.
- 6.6 Decision making with risk.

Expected values with perfect information.

Risk analysis.

Sensitivity analysis.

Expected value and information acquisition.

Lesson 7 Multicriteria methods.

- 7.1 Linear scoring.
- 7.2 Goal programming.
- 7.3 Analytical hierarchy process.

Lesson 8 Dynamic programming.

- 8.1 A basic sequential problem.
- 8.2 Deterministic dynamic programming.
- 8.3 Stochastic dynamic programming.

Methodology

Face to face activities are splitted in two complementary parts:

Master classes: explanation of principals by the teacher without active participation of the students.

Problems and case study solving: the teacher presents a complex question and the students work, alone or in group, to solve it.

Activity	Group	Face to face activity	Time	Non face to face activity	Time	Total time
		Classwork	hours	Homework	hours	hours
Master class	Master class	Explanation of principals. Online theory lessons.	30	Learning, understanding and summarising concepts.	45	75
Problems and case studies	Computer room	Problems and case studies solving	30	Learning, understanding and solving problems and case studies	45	75
Totals			60		90	150

Development plan

Week	Methodology	Lesson	Face to face hours	Non face to face hours	Professor
1	Master class. Problems and case studies.	Lesson 1: Decision making and problem solving.	4	6	José S. Millán
2, 3	Master class. Problems and case studies..	Lesson 2: Introduction to linear programming.	8	12	José S. Millán
4, 5	Master class. Problems and case studies.	Lesson 3: Linear programming applications.	8	12	José S. Millán
6	Master class. Problems and case studies.	Lesson 4: Integer programming and non-linear programming.	4	6	José S. Millán
7, 8	Master class. Problems and case studies.	Lesson 5: Network optimization. Transportation, transshipment and assignment models.	8	12	José S. Millán
9		Evaluation. Examination.	2	3	
10	Master class. Problems and case studies.	Lesson 5: Network optimization. Shortest route, minimal tree span and maximal flow.	4	6	José S. Millán
11, 12	Master class. Problems and case studies.	Lesson 6: Decision theory.	8	12	José S. Millán
13, 14	Master class. Problems and case studies.	Lesson 7: Multicriteria methods..	8	12	José S. Millán
15	Master class. Problems and case studies.	Lesson 8: Dynamic programming.	4	6	José S. Millán
16 - 19		Evaluation. Examination. Resit exam.	2	3	

Evaluation

Continued avaluation

Block	%	Activity	%	Minimum score	Resit exam
1 - First term	25	First term exam	25	5	YES
2 - Second term	25	Second term exam	25	5	YES

Block	%	Activity	%	Minimum score	Resit exam
3 - First term - Homeworks and classworks	25	Homework and classwork lessons 1 - 4	25	5	YES
4 - Second term - Homeworks and classworks	25	Homeworks and classworks lessons 5 - 8	25	5	YES

Score range: from 0 to 10 points

Alternative avaluation

The student who has the approval to be evaluated by alternative evaluation (see requirements and procedure in the evaluation regulations) must take a single exam of all the contents of the subject, which will have a weight of 100% of the final grade.

Bibliography

Hillier Frederick S., Hillier Mark S. (2014) Introduction to management science: a modeling and case studies approach with spreadsheets. 5th ed. McGraw Hill.

Hillier Frederick S., Lieberman Gerald J. (2010) Introducción a la Investigación de Operaciones, 9ª ed. McGraw-Hill.

Additional:

Serra Daniel (2003) Métodos cuantitativos para la toma de decisiones. Gestión 2000.

Online resources:

ORMS-Today Magazine (<http://www.orms-today.org/>)