Universitat de Lleida

DEGREE CURRICULUM

INDUSTRIAL ORGANIZATION II

Coordination: MILLAN GOMEZ, JOSE SEBASTIAN

Academic year 2020-21

2020-21

Subject's general information

<table>
<tr><td>Subject name</td><td>INDUSTRIAL ORGANIZATION II</td></tr>
<tr><td>Code</td><td>14531</td></tr>
<tr><td>Semester</td><td>2nd Q(SEMESTER) CONTINUED EVALUATION / UNDEFINED</td></tr>
<tr><td>Typology</td><td>
<table>
<tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr>
<tr><td>Master's Degree in Industrial Engineering</td><td>1</td><td>COMPULSORY</td><td>Attendance-based</td></tr>
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<tr><td>Course number of credits (ECTS)</td><td>6</td></tr>
<tr><td>Type of activity, credits, and groups</td><td>
<table>
<tr><th>Activity type</th><th>PRAULA</th><th>TEORIA</th></tr>
<tr><td>Number of credits</td><td>3</td><td>3</td></tr>
<tr><td>Number of groups</td><td>1</td><td>1</td></tr>
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<tr><td>Coordination</td><td>MILLAN GOMEZ, JOSE SEBASTIAN</td></tr>
<tr><td>Department</td><td>BUSINESS ADMINISTRATION</td></tr>
<tr><td>Teaching load distribution between lectures and independent student work</td><td>Lectures: 60 hours.
Student work: 90 hours.</td></tr>
<tr><td>Important information on data processing</td><td>Consult this link for more information.</td></tr>
<tr><td>Language</td><td>Spanish.
Learning materials in English, Catalan and Spanish.</td></tr>
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Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
CASTELL CASOL, ALBERT ORIOL	albert.castell@udl.cat	0	
MILLAN GOMEZ, JOSE SEBASTIAN	jose.millan@udl.cat	6	

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 stochastical 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 adquisition.

Lesson 7 Multicriteria methods.

7.1 Linear scoring.

7.2 Goal programming.

7.3 Analytical hierarquy 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

Coverage	Evaluation activity	%	Date	M/V (2)	I/G (3)
Lessons 1 – 5.1	A1.1 Exam. (1) A1.2 Problems. A1.3 Case study.	25 % 15 % 10 %	Week 9 Announced in class Announced in clase	M M M	I I G

Lessons 5.2 – 8	A2.1 Exam. (1) A2.2 Problems. A2.3 Case study.	25 % 15 % 10 %	Week 16 Announced in class Announced in class	M M M	I I G
Resit exam			Week 19		

(1) Written problems (50%) + computer problems (50%).

(2) Mandatory / Voluntary.

(3) Individual /Group.

Bibliography

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

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

Additional:

Hillier F.S., Hillier M.S. (2008) Métodos cuantitativos para administración, 3ª ed. McGraw-Hill.

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

Online resources:

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