

## COURSE SYLLABUS 2018-19

Basic information on the course			
Course:	Quantitative Methods		
Course code:	62102205	Plan:	Grade in Administration and Business Management
Academic Year:	2018/19	Undergraduate/Graduate:	Undergraduate
Degree Year:	2	Type:	Obligatory
Duration:	2nd		
TIME DISTRIBUTION ACCORDING TO REGULATIONS			
Credits:	6		
Total time:	150		
<b>USE OF LEARNING PLATFORM:</b>	Supporting teaching		

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**OTHER IMPORTANT INFORMATION**

## Content justification

The goal is that the student knows several mathematical models related with optimization and decision-making. Particularly, different aspects about mathematical programming (linear and non-linear with restrictions), multicriterial optimization and game theory are studied.

## Courses related in Study Plan

Mathematics I (1st course of ABM), Macroeconomics (2th course of ABM), Operations Management I and II (3th course of ABM), Strategic Management I and II (4th course of ABM).

## Pre-required knowledge

Topics corresponding to a basic Mathematics course of the 1st year of Administration and Business Management.

General education and B1 level in English are required, B2 level is highly recommended.

**COMPETENCES**

## General competences

*Key competences University of Almeria*

- Basic professional skills.
- Oral / written communication in English.
- Problem solving skills.

*Basic competences*

- Understanding and applied knowledge.

## Specific competences

MEC01. Use quantitative tools

MEC02. Be able to modeling business situations

MEC03. Use computer software related with the knowledge of the subject

**LEARNING OUTCOMES**

RD1. The student should have knowledge and understanding in this study area.

UAL1. His/her knowledges, skills and attitudes should enable him/her to understand new theories, interpretations,

methods and techniques within the different knowledge fields to satisfy professional demands.

UAL. The student should be able to identify, analyse, and define the significate elements in a problem for its

resolution with rigor.

MECO1. The student should be able to use quantitative tools.

MECO2. He or she will be able to pose, solve and read practical situations in his/her professional activity. MECO3. The student will be able to use computer software related to the material of the

subject.

**DESCRIPTION OF THE CONTENTS**

Module 1. Linear Programming

Unit 1. Introduction to Linear Programming. Some classical optimization

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problems: transportation problem.

Unit 2. Simplex method

Unit 3. Integer programming. Branch and bound method

Module 2. Non-linear Programming

Unit 4. Constrained optimization with equality constraints. Lagrange multipliers. Economic interpretation.

Unit 5. Constrained optimization with inequality constraints. Theorem of Karush-Kuhn-Tucker.

Module 3. Multicriterial optimization.

Unit 6. Multicriterial problems. Pareto-efficient solutions. Graphical solution of problems with two variables and two objective functions.

Unit 7. Goal Programming

Module 4. Game theory.

Unit 8. Zero-sum games of two players. Pure and mixed strategies.

Unit 9. Cooperative and non-cooperative games. Shapley value.

## COMPETENCY ASSESSMENT

### Criteria and assessment tools

In order to pass it is necessary to score at least 5 points from a maximum of 10. The assessment considers two aspects:

1. A written final exam, weighing 60% of the final grade.
2. Continuous evaluation, weighing 40% of the final score, comprised of written tests, independent works completed by the students, participation in class, or any other complementary activity established by the teachers.

The final grade will be a result of adding both grades, being a necessary condition for passing to get at least 2 points from 6 in the final exam.

For the extraordinary final exam in September, the criteria will be the following:

1. A written final exam, weighing 80% of the final grade.
2. Continuous evaluation during the course, weighing 20% of the final score. So the grade in this item will be half the continuous evaluation mark obtained in June.

### Follow-Up Mechanisms

- Attending the lectures and problem-solving sessions.
- Active participation in classes.
- Individual study and problem solving.
- Use and consult the recommended bibliography, as well as making use of office hours.
- Use of the resources available at Aula Virtual.

## COURSE MATERIALS

### Recommended course materials

- Decisiones multicriterio: fundamentos teóricos y utilización práctica (Barba-Romero, S.)
- Introducción a la investigación de operaciones (Hillier, F.L. y Lieberman, G.L.)

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- Linear programming and economic analysis (*Dorfman, R., Samuelson, P.A., Solow, R.M.* )
- Optimización: cuestiones, ejercicios y aplicaciones a la economía (*Barbolla, R., Cerdá, E. y Sanz, P.*)
- Programación lineal y no lineal (*Luenberger, D.E.* )
- Programación matemática (*Balbás de la Corte, Alejandro*)
- Teoría de juegos (*Pérez Navarro, J., Jimeno Pastor, J.L., Cerdá Tena, E.*)
- Teoría de juegos con aplicaciones a la economía (*Friedman, James W.*)

*Complementary*

- Aplicaciones de Álgebra Lineal (Grossman, S.I. )
- Matemáticas II. Economía y Empresa. Teoría. (Rodríguez, J., Prieto, E., Hernández, V. y Gómez, P. )

*Other materials*

Couse materials available in UAL's library

<http://almirez.ual.es/search/e?SEARCH=METODOS CUANTITATIVOS>

**WEBSITE**

<http://home.ubalt.edu/ntsbarsh/opre640a/partVIII.htm>

*Deterministic Modeling: Linear Optimization with Applications*

<http://home.ubalt.edu/ntsbarsh/Business-stat/opre/PartIII.htm>

*Integer Optimization and the Network Models*

<http://home.ubalt.edu/ntsbarsh/Business-stat/opre/partIV.htm>

*The Classical Simplex Method*

<http://home.ubalt.edu/ntsbarsh/Business-stat/opre/partVI.htm>

*Introduction to Game Theory: Wining Business in A Competitive Environment*

<http://home.ubalt.edu/ntsbarsh/Business-stat/opre/nonlinear.htm>

*From Linear to Nonlinear Optimization with Business Applications*

<http://www.gambit-project.org/>

*Freeware with tools of Game Theory*

<http://www.phpsimplex.com/>

*Online tool for solving linear programming problems.*

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