# uc3m | Universidad Carlos III de Madrid

## Quantitative models and methods in management II

**Academic Year: ( 2019 / 2020 )**                                    **Review date: 14-05-2020**

**Department assigned to the subject: Mechanical Engineering Department**

**Coordinating teacher: GARCIA GUTIERREZ, ISABEL**

**Type: Electives  ECTS Credits : 6.0**

**Year : 4 Semester :**

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

No previous courses are required.

## OBJECTIVES

Knowledge of the fundamentals of quantitative methods applied to complex problems in industrial management.
Ability to apply the most suitable technique in each case.
Results interpretation and value of the result in the context of the real situation.
Define simulation models for the study of alternative cofiguration in industrial management.
Identify the classical non polynomial problems whose resolution require the use of heuristic methods.
Know the fundamentals and dynamic of heuristic search algorithms and of nature-inspired algorithms.

## DESCRIPTION OF CONTENTS: PROGRAMME

Productive and logistic system analysis by means of discrete event simulation.
Design of simulation models.
Simulation model implementation.
Result analysis and configuration comparison in simulation.
Introduction to NP problems. Review of the classical NP problems: the salesman problem, the knapsack problem, task programming with limited resources.
Heuristic search algorithms.

## LEARNING ACTIVITIES AND METHODOLOGY

Lectures, exercises, practical sessions, cases and assignments to be carried out by the students and discussed during the sessions, autonomous student work, individual and group toutoring. Practical sessions in the laboratory.
Participation in the partial and final evaluation sessions.

## ASSESSMENT SYSTEM

Partial exams (approximately in the weeks indicated in the schedule), group projects and compulsory laboratories.

Minimimum grade required in the final exam: 3,5

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| **% end-of-term-examination:** | 40 |
| **% of continuous assessment (assigments, laboratory, practicals…):** | 60 |

## BASIC BIBLIOGRAPHY

- Adenso Díaz Optimización heurística y redes neuronales, Paraninfo, 1996 (Capítulos 1 y 3)

- Goldberg Genetic algorithms in search, optimization, and machine learning, Addison-Wesley, 1989 (Capítulos 1 y 2)

- Haupt and Haupt Practical genetic algorithms, John Wiley & Sons, 1998

- Law and Kelton Simulation modeling and analysis , McGraw-Hill, 2007

- Rich and Knight  Inteligencia artificial, McGraw-Hill, 1994 (Capítulos 2 y 3)

- Taha, H. Investigación de operaciones, Pearson, 2004