Optimization

Academic Year: (2020 / 2021) **Review date: 01-07-2020**

Department assigned to the subject: Department of Statistics

Coordinating teacher: NOGALES MARTIN, FCO. JAVIER

Type: Electives ECTS Credits : 6.0

Year : 2 Semester : 1

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

The goal of this course is to provide some familiarity with the modeling and application of optimization methods for a series of general problems (linear programming, nonlinear programming and optimization under uncertainty) whose importance has increased greatly in recent times, specially in areas such as Economics, Finance and Engineering.

In this subject, the students will learn about the basic (mathematical) foundations that support the development of solution algorithms for the optimization problems mentioned above (linear and nonlinear programming and optimization under uncertainty). They will also obtain a basic knowledge related to the numerical issues associated with the implementation of these algorithms, through the preparation of simple codes for some of these algorithms. Finally, the students will get some familiarity with efficient model representations for these problems, through the introduction and analysis of some examples based on practical problems corresponding to the preceding classes of problems considered in the course.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction
1.1 Motivation
1.2 Examples

2. Unconstrained optimization
2.1 Optimality conditions
2.2 Algorithms

3. Constrained optimization
3.1 Introduction
3.2 Optimality conditions
3.3 Algorithms

4. Optimization under uncertainty
4.1 Stochastic optimization
4.2 Robust optimization

LEARNING ACTIVITIES AND METHODOLOGY

Theory (2/3 of the sessions): During theoretical sessions, the contents of the course will be introduced, explained and illustrated with examples. Teaching materials will be provided on the Internet.

Practice (1/3 of the course sessions): Applications.

ASSESSMENT SYSTEM

Continuous evaluation along the course: it consists of 5 homeworks (theoretical and practical) and a final project.

% end-of-term-examination:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

BASIC BIBLIOGRAPHY

- A. Ruszczynski, A. Shapiro Stochastic Programming, Elsevier, 2003

- A.R. Conn, N.I.M. Gould y Ph. Toint: Trust-region methods., SIAM publications, 2000..
- D.B. Bertsekas: Nonlinear Programming., Athena Scientific, 1999..
- G.N. Nash y A. Sofer: Linear and Nonlinear Programming., McGraw-Hill, 1996..
- J. Nocedal y S.J. Wright: Numerical Optimization., Springer-Verlag, 1999..
- J.R. Birge y Francois Louveaux: Introduction to Stochastic Programming., Springer-Verlag, 1997..
- P.E. Gill, W. Murray y M.H. Wright: Practical Optimization., Academic Press, 1981..
- S. Boyd and L. Vandenberghe Convex Optimization, Cambridge University Press, 2004
- Stein W. Wallace (Ed.): Applications of Stochastic programming., Book Data Limited, UK, 2005..