

27018 - Operations Research

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	453 - Degree in Mathematics
ECTS	6.0
Course	3
Period	First semester
Subject Type	Compulsory
Module	---

1. Basic info

1.1. Recommendations to take this course

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

To provide students with an introduction to optimization models, methods, and their applications. Students will develop the ability to conceptualize from real-world situations appropriate mathematical programming models. The students will model, analyze, solve, and interpret results of decision-making problems.

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

A midterm exam will be given on November.

The final exam will be given at the end of the semester (see the final exam schedule published by the Faculty of Sciences).

Exams are closed book and closed notes.

5.Activities and resources

5.1.General methodological presentation

Lectures (50% classes)

Operations Research problems resolution (35% classes)

Laboratories (15% classes)

5.2.Learning activities

Lectures, problems resolution classes and laboratories.

Lecture slides and other important materials will be posted on moodle2@unizar.es. Please check there regularly.

5.3.Program

Course outline:

Topic 1: *Introduction to Operations Research.*

Topic 2: *Convex Analysis.*

Convex sets. Polyhedra. Extreme points and extreme directions of a polyhedron. Convex functions.

Topic 3: *Introduction to Nonlinear Programming.*

Unconstrained and constrained minimization. Karush-Kuhn-Tucker optimality conditions.

Topic 4: *Linear Programming.*

Problem formulation. Basic concepts and fundamental theorems. The simplex algorithm.

Topic 5: *Duality and Sensitivity Analysis.*

Formulation of the dual problem. Primal-dual relationships. The dual-simplex algorithm.

Topic 6: *Special Models in Linear Programming.*

Transportation, transshipment and assignment problems.

Topic 7: *Integer Programming*.

Problem formulation. Branch and bound algorithm.

5.4.Planning and scheduling

See the oficial scheduling in the Faculty of Sciences web page.

5.5.Bibliography and recomended resources

Bazaraa, Mokhtar S.. Linear programming and network flows / Mokhtar S. Bazaraa, John J. Jarvis, Hanif D. Sherali . - 2nd. ed. New York [etc.] : Wiley & Sons, cop. 1990

Bazaraa, Mokhtar S.. Nonlinear programming : theory and algorithms / Mokhtar S. Bazaraa, Hanif D. Sherali, C. M. Shetty . - 3rd ed. Hoboken (New Jersey) : John Wiley & Sons, cop. 2006

Calvete Fernández, Herminia Inmaculada. Programación lineal, entera y meta : problemas y aplicaciones / Herminia I. Calvete Fernández, Pedro M. Mateo Collazos Zaragoza : Prensas Universitarias de Zaragoza, 1994

Dantzig, George B.. Linear programming. Vol. 1, Introduction / George B. Dantzig, Mukund N. Thapa New York [etc.] : Springer, cop. 1997

Dantzig, George B.. Linear programming. Vol. 2, Theory and extensions / George B. Dantzig, Mukund N. Thapa New York [etc.] : Springer, cop. 2003

Hillier, Frederick S.. Introducción a la investigación de operaciones / Frederick S. Hillier, Gerald J. Lieberman ; Traducción, Jesús Elmer Murrieta Murrieta ; revisión técnica, Javier Enríquez Brito . - 8a. ed. México [etc.] : McGraw-Hill, cop. 2006

Hillier, Frederick S.. Introducción a la investigación de operaciones / Frederick S. Hillier, Gerald J. Lieberman ; revisión técnica, Guillermo Martínez del Campo V., Ernesto A. Pacheco . 9a. ed. México [etc.] : McGraw-Hill, cop. 2010

Winston, Wayne L.. Operations research : applications and algorithms / Wayne L. Winston . - 4th ed. Belmont, California : Thomson/Brooks/Cole, cop. 2004