Course guide
240755 - 240755 - Operations Research

LECTURER

Coordinating lecturer: Daniel Serra de la Figuera

Others:

PRIOR SKILLS

Basic Mathematics and statistics

TEACHING METHODOLOGY

- Face-to-face sessions
- Activities including readings, power point slides, and other materials, Please read materials before the sessions.
- Homeworks
- Tests

LEARNING OBJECTIVES OF THE SUBJECT

General:

Instrumentals
Organization and planning capacities.
Knowledge of software.
Problem solving.
Information search and processing

Interpersonal
Oral communication in public.
Team work.
capacity to write technical reports.

Systematics
Critical reasoning skills in both reading and writing communication.
Good analysis of qualitative and quantitative information.
Adaptation yo new situations and environments.

Specific:

Academic and professionals
Recognize the relevance of quantitative methods in decision making within management organizations.
To be able to know when these tools can be used, and in which environments, and when not to use them.
To learn how to apply these tools and methodologies of quantitative methods in managerial problems.
To be able to use information system technologies and optimization software as a support for complex decision making situations.
To develop the understanding of the results obtained and how to implement them in "real world" situations

CONTENTS

1. Introduction to modelling and decision making

Description:
Introduction to modelling and decision making

Full-or-part-time: 1h 30m
Theory classes: 1h 30m

2. Linear Programming

Description:
2.1. Structure of the problem.
2.2. Mathematical conditions.
2.3. Objectives and constraints.
2.4. Examples of formulations: human resources problems, capacity problems, transportation problems.

Full-or-part-time: 9h
Theory classes: 9h

3. Solution methods in LP

Description:
3.1. Graphical method
3.2. The simplex algorithm
3.3. Solver and other software.
3.4. Heuristic methods

Full-or-part-time: 9h
Theory classes: 9h

4. Multiobjective programming

Description:
4.1. Objective space
4.2. Efficiency in solutions
4.3. The weighting method and constraint methods. Case studies.
4.4. Goal programming

Full-or-part-time: 5h
Theory classes: 5h

5. Integer programming

Description:
5.1. Problem formulation
5.2. The branch and bound procedure
5.3. The knapsack problem
5.4. Assignment problems

Full-or-part-time: 5h
Theory classes: 5h

6. Network Models

Description:
6.1. Network notation
6.2. Minimum spanning tree
6.3. Maximal flow
6.4. Shortest Path
6.5. Location problems

Full-or-part-time: 5h
Theory classes: 5h

7. Project Management

Description:
7.1. Critical Path Model
7.2. PERT
7.3. PERT/CMP
7.4. PERT/cost
7.5. Case study

Full-or-part-time: 4h 30m
Theory classes: 4h 30m

GRADING SYSTEM

Final exam: 60% of the grade.
Continuous evaluation: 40% of the grade:
25% homeworks and case studies
15% tests

BIBLIOGRAPHY

Basic:
- Hillier F., Hillier M. y Lieberman, G.. Introduction to Management Science: A Modeling & Case Studies Approach. 6th ed. New York: McGraw Hill, 2018. ISBN 9781260716290.
- Render, Barry [et al.]. Quantitative analysis for management. 14th ed. Harlow: Pearson Prentice Hall, 2024. ISBN 9781292459080.