VNIVERSITAT DE VALÈNCIA

Course Guide
44479 Operations research

COURSE DATA

Data Subject	
Code	44479
Name	Operations research
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
2212 - M.U. en Dirección de Empresas. MBA 15-V.2	Faculty of Economics	1	First term

Subject-matter

Degree	Subject-matter	Character
2212 - M.U. en Dirección de Empresas. MBA 15-V.2	3 - Quantitative methods for decision-making	Obligatory

Coordination

Name	Department
QUINTANILLA ALFARO, MARIA SACRAMENTO	257 - Business Mathematics

SUMMARY

Operational Research offers a series of procedures through which valuable information is obtained to evaluate the repercussions of various solutions. This approach is an objective and quantitative basis on which to support decisions. The main objective of this course is to develop the student's ability to recognise situations in which operational research can be used effectively, mathematically model such solutions, choose the most appropriate resolution technique for the model built, apply that technique to solve the model through appropriate commercial software, and finally, interpret the results.

The course reviews numerous case studies taken from different business environments to illustrate the optimisation process, from determining the model to analysing the solution obtained through the software studied. The course is self-contained and the necessary prior knowledge is reduced to user-level computing and basic mathematics. However, students with advanced computer skills will also find techniques and strategies for developing business optimisation applications. At the end of the course, students will be aware of a wide range of techniques that will be useful in their professional future.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

OUTCOMES

2212 - M.U. en Dirección de Empresas. MBA 15-V.2

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Prepare, write and publicly present business reports and projects in a clear and coherent manner, defend them with rigour and tolerance and respond satisfactorily to criticisms relating to them.
- Seek, select and assess information from the different actors in the environment, both through traditional methods and information and communication technologies, to use it effectively in the face of problems and situations related to business activity.
- Analyse, synthesise and evaluate information, in a rigorous and critical manner, and be able to identify assumptions, assess evidence, detect false logic or reasoning, identify implicit values, and generalise adequately about problems and situations related to the business world.
- Analyse and assess the functional areas of the company with the aim of understanding its current and potential strengths and weaknesses as a support for decision making.
- Analyse different quantitative methods to solve problems in situations of uncertainty and specify the strategies to improve the companys overall performance and get ahead of competitors.
- Compare the solutions found for complex problems of company management, examine the most suitable method for decision making both at the tactical and the strategic level, and give the reasons for selecting this method.

LEARNING OUTCOMES

At the end of the teaching-learning process the student will have learned to:

1: Correct definitions of the basic concepts in operations research.

2: Recognise the different types of mathematical programming models and know how to apply the techniques and strategies for each mathematical model.

3: Model real situations as mathematical formulations, especially those involving decision-making in complex scenarios.

4: Understand the optimisation tools available in the market, and their possible adaptation to the problems of the business environment.

5: Solve optimisation problems with the appropriate software and interpret the results.

6: Validate if the solution given for the model is valid for the real problem, or if new variables and/or restrictions are needed in the model.

DESCRIPTION OF CONTENTS

1. Basic concepts

1.1 Models and classification
1.2 Phases of the modelling process
1.3 Fundamental aspects of modelling

2. Linear Programming Models

2.1. The Linear Model
2.2 Applications of Linear Programming
2.3 Sensitivity Analysis
2.4 Resolution with Solver

3. Nonlinear Programming Models

3.1. The Noninear Model
3.2. Applications of Nonlinear Programming
3.3 Resolution with Solver

4. Integer Linear Programming Models

4.1 Modelling with integer variables
4.2 Resolution algorithms: Accurate and heuristic methods
4.3 Resolution with Solver

5. Structured Problems in Combinatorial Optimisation

5.1 Models of transport and distribution
5.2. Location problems
5.3. Vehicle routing problems
5.4.Network optimisation models

6. Project Management

6.1 Introduction to Project Management
6.2 Project Planning
6.3 Monitoring and control of projects

WORKLOAD

ACTIVITY	Hours	% To be attended
Computer classroom practice	24,00	100
Tutorials	6,00	100
Development of group work	6,00	0
Study and independent work	10,00	0
Preparation of evaluation activities	6,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	10,00	0
Resolution of case studies	3,00	0
TOTAL	**75,00**	

TEACHING METHODOLOGY

The classes are oriented to the resolution of practical cases. Teaching is given in computer rooms with continuous work by the students, thus favouring the interaction between lecturers and students. This practical orientation facilitates the participation of students, enables the continuous assimilation of the contents, and self-evaluation.

Students must also perform a set of tasks individually and/or in a group that will consist in solving and interpreting solutions to new problems. The proposed solutions will be discussed and debated in the following sessions.

EVALUATION

The evaluation process includes the active participation of students in class, their participation in practical sessions, and work presented individually and in groups. The continuous evaluation will be marked out of 6. Finally, an exam will be marked out of (10 - the mark obtained in the continuous evaluation). The final mark will be the sum of the continuous evaluation plus the mark of the final exam. The continuous evaluation mark will remain unchanged in any exam resit.

REFERENCES

Basic

- Taha,H.A.,2017, Investigarción de Operaciones, décima edición, Pearson
- Hillier, F.S. , Lieberman, G.J. , 2023, Investigación de Operaciones, decimo primera edición, Mc Graw Hill.
- Horine, G. M., 2010, Gestión de proyectos, Anaya Multimedia

Additional

- Gil Gambarte, L.A., 2016, Project 2016, Anaya multimedia
- Valdés-Miranda, Claudia, 2022, Excel 2022. Anaya multimedia