VNIVERSITAT DE VALÈNCIA

Course Guide
35830 Distribution optimization

COURSE DATA

Data Subject	
Code	35830
Name	Distribution optimization
Cycle	Grade
ECTS Credits	4.5
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1313 - Degree in Business Management and Administration	Faculty of Economics	4	First term

Subject-matter

Degree	Subject-matter	Character
1313 - Degree in Business Management and Administration	52 - Optatividad Dirección de Operaciones y Logística	Optional

Coordination

Name	Department
MOCHOLI ARCE, MANUEL	257 - Business Mathematics

SUMMARY

The aim of the course is to provide the student with the appropriate mathematical and computes tools to make decisions regarding the problems of distribution, transportation, location of service centers and design of distribution routes. For this, it is intended to train the student in the art of constructing mathematical models that reflect the aforementioned problems, teaching how to implement these mathematical models in a computer program that allows them to solve them and extract the maximum information from the solutions, to make the most appropriate decision and be able to make proposals for improvement.

In addition, it is intended that the student learns to debate with their peers, and defend their opinions in front of the rest and make relevant criticisms of the opinions of others, from the discussions that the teacher will encourage in the practical classes and seminars.

- Develop the ability to work in groups.
- Ability to obtain information and describe a real problem in mathematical terms.
- Being able to present and defend their ideas in a coherent manner, and with the necessary arguments to convince their colleagues of the appropriateness of their proposals and know how to accept or refute their criticisms.
- Create a critical attitude that allows you to make argued judgements and defend them with rigor and tolerance about the works and opinions expressed by your colleagues.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

No es necesario, pero sí conveniente tener los conocimientos de la materia Matemáticas II de primer curso

OUTCOMES

1313 - Degree in Business Management and Administration

- Demonstrate capacity for analysis and synthesis.
- Demonstrate oral and written communication skills in the native language.
- Be able to solve problems.
- Be able to make decisions.
- Be able to work in a team.
- Have critical and self-critical capacity.
- Be able to learn autonomously.
- Be able to understand and use the different quantitative and qualitative methods to reason analytically, evaluate results and predict economic and financial parameters.
- Be able to apply analytical and mathematical methods for the analysis of economic and business problems.
- Be able to define, solve and present complex problems systemically.
- Be able to express oneself in formal, graphic and symbolic languages.

LEARNING OUTCOMES

- Get to know the different models of warehouse management, transportation, business location of facilities, and design and route planning.
- Be able to model and implement real business problems corresponding to the issues addressed.
- Be able to analyze the solutions obtained and make proposals for improvement

DESCRIPTION OF CONTENTS

1. Introduction to GAMS program

1. Definition of sets, data, variables and equations.
2. Reading and writing files.
3. Loops.

2. Transportation problem

1. Modelling of transportation problem.
2. Mathematical properties of the transportation problem
3. Transshipment Problems
4. Multidimensional transportation problem.
5. Generalized transportation problem

3. Assignment Problems

1. Introduction
2. Modeling of the problem.
3. Properties of the assignment problem.
4. Variations of the assignment problem

4. Network flow programming

1. Introduction.
2. Modelling and graph theory
3. The shortest path problem.
4. Floyds algorithm.
5. Maximum flow problem.
6. Minimum cost flow problem

5. Facility Location Problem

1. Introduction.
2. P-Median Problem
3. P-Center Problem
4. Set Cover Problem

6. Traveling salesman and vehicle routing problems

1 Introduction.
2. Traveling salesman problem
2. Exact methods.
3. Heuristics.
4. Vehicle Routing problem.
5. Vehicle Routing Problem with Time Windows

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	22,50	100
Computer classroom practice	22,50	100
Development of group work	7,00	0
Development of individual work	5,00	0
Study and independent work	20,00	0
Readings supplementary material	6,00	0
Preparation of evaluation activities	5,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	10,00	0
Resolution of case studies	4,00	0
TOTAL	**112,00**	

TEACHING METHODOLOGY

The development of the subject is structured in a session of theory per week of an hour and a half of duration, and in a practice session of the same duration.

In the theoretical classes, the teacher of each subject, will highlight the most relevant aspects which he considers to be more difficult for the student to understand. He will make some examples and guide the learning of the students through the materials available in the virtual classroom, the teacher's website and the reference manuals. At the end of each class, the teacher will comment on the materials of the virtual classroom that the student must prepare for the next class.

In the practical classes it will be combined the resolution of problems by the teacher with similar ones by the students, for which, with at least a week before each practical class, the teacher will publish in the virtual classroom some problems, so that the students try to solve them and in each of the practical sessions it will be raised by the teacher the analysis and discussion among the students of the models proposed by them, as well as the best implementation to be solved with the computer and the decisions to be taken from the solution obtained.

It is considered ESSENTIAL for an adequate follow-up of the subject that the students attend the theory classes with the teaching material, which will be completed with the class explanations and the practical classes with the proposed problems.

EVALUATION

The subject will be evaluated based on the consideration, in this order of importance, of the following aspects:

- An exam at the end of the semester that will allow the student to obtain up to 70% of the final grade (7 points out of 10). This exam will consist of theoretical and practical questions and problems to sole with the computer.
- An evaluation of the activities developed by the student (individual and / or in group) during the semester both from the preparation of papers, oral presentations and the delivery of solved problems, their active participation in class and their attitude towards their classmates. This part of the evaluation will allow the student to obtain up to 30% of the final grade (3 points out of 10).

This way, the total evaluation of the student is broken down as follows:

Realization of exercises, works and attitude 30%

Exam at the end of the semester 70%

The subject will be considered passed if the student gets 5 points out of 10 as a weighted sum of all previous concepts. However, it is considered essential to pass the final exam, which is mandatory. In case of not passing the final exam, the maximum grade that the student can obtain as sum of all the components will be of 4.5 points.

Regarding the attitude in the performance of work and examinations, the students must take into account that copying in an exam of plagiarizing the work of other people is considered a very serious fault, so it will not be tolerated in any case. In the event that the teacher suspects that a student has copied in any written test or delivery of work, this student will obtain a zero in that test. Therefore, it is extremely important to avoid the suspicion that you have copied (for example, by looking at a colleague’s exam or copying your work) or plagiarism has been committed (that is, using other people’s sentences as if they were their own). For the consequences that this may entail

REFERENCES

Basic

- Aula virtual

Ballow R.H. (2013): Logística: Administración de la cadena de suministro. Pearson Prentice Hall

Chopra S y Meindl P. (2008): Administración de la cadena de suministro. Estartegia, Planeación y Operación. Pearson Prentice Hall

Hillier F.S. y Liberman G.J. (2015): Introducción a la Investigación De Operaciones . McGraw-Hill. Séptima

Taha H. A. (2012): Investigación De Operaciones. Pearson Prentice Hall
Richard E. Rosenthal. GAMS USER'S GUIDE. 2016
Bruce A. McCarl. McCarl Expanded GAMS User Guide. 2016
https://www.gams.com/latest/docs/UG_MAIN.html

Additional

- Bazaraa, M.S. y Jarvis, J.J. (1981): Programación lineal y flujo en redes. Ed. Limusa. México

Mocholí, M. y Sala, R. (1.993): Programación Lineal. Metodología y Problemas. Ed. Tebar Flores. Madrid.

Mocholí, M. y Sala, R. (1.999): Decisiones de optimización. Ed. Tirant lo Blanc. Valencia.

Prawda, J (2000) : Métodos y modelos de la investigación de operaciones. Ed. Limusa. Mexico

Thompson, G.L. y Thore, S.(1992) : Computational Economics. Ed. Scientific Press. San Francisco.

Williams, H.P .(2013) : Model building in Mathematical Programming. Ed. John Wiley & Sons.New York.