COURSE DATA

Data Subject	
Code	35933
Name	Mathematics II
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1315 - Degree in Finance and Accounting	Faculty of Economics	1	Second term

Subject-matter

Degree	Subject-matter	Character
1315 - Degree in Finance and Accounting	5 - Mathematics	Basic Training

Coordination

Name	Department
CALVO LOPEZ, CLARA	257 - Business Mathematics

SUMMARY

The matter of "Mathematics II" is a compulsory subject that is taught twice a year in the first year, second semester of Business Administration and Management.

This course develops the concepts and basic mathematical optimization techniques in order to provide students with the mathematical tools appropriate to address the problem of allocating scarce resources among alternative uses. Mathematical optimization techniques are necessary to address the theory of the firm, consumer theory, growth models, and so on. For this reason, the first issues of this course introduce the terminology and basic concepts of optimization. The following topics will extend these skills and develop solution techniques for the student, faced with a real practical situation to know how to plan, solve and interpret the results.

After entering the basic concepts, it addresses the non-linear programming as a more general optimization problem, where interesting special cases are treated as unrestricted problems, problems with equality constraints (classic programming) and problems with non-negative variables, in addition general case with constraints given by inequalities. From Item 3 develops linear programming, where the fact that the functions are linear allows the use of efficient methods than those presented for the general case. Linearity can also analyze a more complete solution to the problem by duality and sensitivity analysis.

The special case in which the problem variables can take only integer values are discussed in the last issue.

The relevance of these problems and their frequency in the economic and business world make the powers of abstraction, synthesis and analysis for proper assessment of the situation and approach the problem and knowledge of procedures for solving and analysis, basic skills must have a good degree in economics, in addition, are highly valued in the labor market.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

They assume prior knowledge corresponding to the course Mathematics I. These skills include basic concepts of analysis (and including the concept and calculation of partial derivatives,gradient vector and Hessian matrix), the graphical representation functions in R^2 and calculate the inverse of a matrix.

OUTCOMES

1315 - Degree in Finance and Accounting

- Aplicar los principios del análisis económico al diagnóstico y resolución de problemas.
- Conocer el lenguaje matemático y el razonamiento lógico-deductivo en la formulación de los fenómenos económico-empresariales.
- Conocer y comprender las herramientas matemáticas básicas para la descripción, análisis y toma de decisiones financieras y empresariales.
- Uso de los programas Informáticos básicos.

LEARNING OUTCOMES

• Ability to recognize an economic problem from observing economic reality.

• Increase of the ability to use logical reasoning / strategy to address real situations of the economic world.

• Use of basic quantitative tools and their application in the economic environment.

• Ability to select a theoretical framework for the development of the analysis.

• Being capable of applying different methods and analysis techniques using computer programs.

DESCRIPTION OF CONTENTS

1. Introduction to Optimization

Introduction: the problem and its parts. Basic concepts: feasible solution, classes of optimum and classification of problems. Convexity. Basic theorems. The modeling process. Syntax of the computer program.

2. Nonlineal Programming

Introduction. Kuhn-Tucker conditions. Basic theorems of non-linear programming. Interpretation of K-T multipliers. Modeling, interpretation and computer resolution of non-linear programming models: existence and globality of the solution and interpretation of the multipliers.

3. Introduction to linear programming

The linear problem: Types of solutions. Basic feasible solutions. Fundamental theorems of Linear Programming. Modeling, computer resolution and interpretation of linear programming models. Advanced syntax of the computer program.

4. The simplex method

Introduction. Simplex algorithm. Modeling, computer resolution and interpretation of linear programming models: type of solution and interpretation of the reduced cost.

5. Sensitivity analysis and post-optimization

Introduction. Sensitivity and post-optimization of the coefficients of the objective function and the right-hand sides of the constraints. Introducing new variables. Modeling and computer resolution of linear programming models: sensitivity analysis.

6. Integer Linear Programming

Introduction. General formulation of integer linear problems. Branch-and-bound method. Modeling, computer resolution and interpretation of integer linear programming models.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Computer classroom practice	30,00	100
Development of group work	5,00	0
Development of individual work	4,00	0
Study and independent work	15,00	0
Preparation of evaluation activities	31,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	20,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

Theory classes:

The teacher will highlight the main aspects and those more difficult to understand, solve exercises and guide the students learning by means of the materials available in the virtual classroom and the reference manuals. After the class, the materials needed for the next class will be indicated, so that students can prepare for the session.

Practical classes:

Practical classes will primarily address issues related to modeling, computer resolution and interpretation of the results obtained, applying all relevant theory. Previously, the teacher will solve some models and propose some others for subsequent classes. In each class, students should be able to defend the adequacy of its own model and to take decisions in the light of the results.

Theoretical and practical classes are completed with the proposed individual and/or group exercises in which the students will model problems in the area of economics and business, solve them with the computer and interpret their solutions.

EVALUATION

a) Continuous assessment (5 points)

It is based on the student's attendance, participation and involvement in the teaching-learning process and in the practical activities carried out by the student during the semester, including individual and group work, and the defense of the positions developed by the student.

It consists of the study of practical cases, their mathematical modeling, their resolution with computer and the interpretation and discussion of the results obtained and, if appropriate, it can also contain theoretical-practical exercises.

b) Final exam (5 points)

The final exam will consist of solving theoretical-practical problems.

To pass the subject it will be necessary to obtain at least 2 points in the final exam, at least 2 points in the continuous assessment, and the sum of both marks must be at leat 5 points. If the student does not reach the minimum required mark in one of the parts, the final mark will not be greater than 4.5.

In the first call and, if necessary, in the second one, the student will have to take the final exam (5 points). Voluntarily, on that same date, he/she will be able to take a retake exam (5 points) corresponding to the contents of the continuous assessment.

In both calls, in order to retake the continuous asesssment, the teacher may require the student to request it by email at least 5 days in advance.

REFERENCES

Basic

- Font, B (2009): Programación matemática para la economía y la empresa. 2ª Edición. Laboratori de Materials, 1. Valencia, PUV.
- Ivorra, C. (2009): Programación matemática. (http://www.uv.es/~ivorra).
- Ivorra, C. (2009): Programación matemática. Práctica con GAMS. (http://www.uv.es/~ivorra).
- Meneu, R. (2013): Apunts de teoria de Matemàtiques II (http://roderic.uv.es/handle/10550/25760).
- Meneu, R. (2013): Material de pràctiques de Matemàtiques II. (http://roderic.uv.es/handle/10550/25759)
- Mocholí, M. y Sala, R. (1999): Decisiones de optimización (2ª Edición). Valencia, Tirant lo Blanch.
- Bas M.C, Sala-Garrido R., Meneu-Gaya R., Marín M.J., Benítez R. (2018). Vídeos docents de Matemàtiques II. Projecte d'Innovació Docent: "Preferències en laprenentatge de lassignatura Matemàtiques II: Docència inversa i presencial amb aprenentatge cooperatiu". MMedia UV.

Additional

- Arévalo, M. T., Camacho, E., Mármol, A. y Monroy, L. (2004): Programación matemática para la economía. Madrid, Delta Publicaciones.

- Barbolla, R., Cerdá, E. y Sanz, P. (2001): Optimización: Cuestiones, ejercicios y aplicaciones a la economía. Madrid, Pearson Education, Prentice Hall.
- Hillier, F. S. y Lieberman, G. J. (2002): Investigación de operaciones (7ª Edición). México, McGraw-Hill.
- Mocholí, M y Sala R (1993): Programación Lineal: Metodología y problemas. Madrid, Tebar Flores.
- Taha, H. A. (2004): Investigación de operaciones (7ª Edición). México, Pearson Education, Prentice Hall.