Matemáticas y Algebra Lineal / Mathematics and Linear Algebra

Grado en Economía y Negocios Internacionales

UNIVERSIDAD NEBRIJA

SYLLABUS

Course: Mathematics and Linear Algebra

Degree: Grado en Economía y Negocios Internacionales

Type: Core

Languages: This course will be taught in English

Modality: In-Person and Online

Credits: 6

Year: 1st

Semester: Fall Semester

Professors and contact information: Álvaro Martín, Javier Rivas and Mirco Soffritti.

1. COMPETENCIES AND LEARNING OUTCOMES

1.1. Competencies

The objective of this subject is to provide the student with the quantitative knowledge that is necessary to come up and analyze economic problems in a rigorous manner. To do this, the student must acquire a mix of knowledge, skills and attitudes.

Basic competencies

CB1, CB2, CB4, CB5.

General competencies

CG8, CG9.

Specific competencies

CE9, CE16.

1.2. Learning objectives

The student at the end of this subject will know how:

1. To organize information
2. To utilize quantitative techniques of data analysis and economic variables

2. CONTENT

2.1. Prerequisites

None

2.2. Description

This course covers matrix theory and linear algebra. The basics of Linear Algebra and tools are studied. In this course we will apply those tools to problems in business and economics. Linear Algebra is a branch of mathematics that studies the properties of matrices and systems of linear equations. The basic concepts of Linear Algebra are extremely useful both in economics and social sciences.

2.3. Covered Topics

1. **Real functions of one variable.**
   Domain, limits, and continuity.
   Limits indeterminacy
   Graphical representation of a function

2. **Function optimization.**
   Calculation of derivatives and their application to study the monotony of a function as well as the identification of its maxima and minima.

3. **Function integration.**
   Introduction to the concept of primitive function and analysis of the various methods of calculation of an indefinite integral. Calculation of areas.

4. **Linear algebra.**
   Elementary properties of matrices.
   Determinants.
   Linear systems of equations.

5. **Real functions of two variables.**
   Representation of contour lines.
   Optimization of a two-variable function.

2.4. Individual / Group Assignments

In-class personal and teamwork (groups of 2 or 3 students) with the development of problems, Mock exams, online forum, proposal (by student and uploaded to the platform) of mathematical problems with a developed completely solution. The scoring will based on the quality and depth of the set of proposed activities.

2.5. Learning Activities

In-Person Learning	Hours	Attendance %
AF1 Lecture / Theoretical Foundations	**45**	**100%**
AF2 Case Studies	**9**	**100%**
AF3 Tutorial	**9**	**100%**
AF4 Individual / Group Assignments	**18**	**0%**
AF5 Online Assignments	**6**	**50%**
AF6 Extracurricular Materials	**6**	**0%**
AF7 Self Study	**57**	**0%**

Online Learning	Hours	Attendance %
AF8 Online Lecture	**12**	**50%**
AF9 Online Case Studies	**12**	**0%**
AF5 Online Assignments	**48**	**0%**
AF6 Extracurricular Materials	**18**	**0%**
AF7 Self Study	**24**	**0%**
AF10 Online Tutorial	**12**	**100%**
AF11 Individual / Group Assignments	**24**	**50%**

Methodologies: **In-Person:** MD1, MD2, MD3, MD4 **Online:** MD1, MD2, MD3, MD4

3. GRADING RUBRICS

3.1. Grades

Grades are calculated as follows:

0 - 4.9 Fail (SS)
5.0 - 6.9 Pass (AP)
7.0 - 8.9 Notable (NT)
9.0 - 10 Outstanding (SB)

The mention of "Matrícula de Honor" may be awarded to students who have obtained a grade equal to or greater than 9.0.

3.2. Evaluation criteria

Ordinary Session

Modality: In-Person

Evaluation Criteria	Percentage
S1 Attendance and Participation	10%
S2 Individual / Group Assignments	30%
S3 Midterm Exam (On-Site)	10%
S4 Final Exam (On-Site)	50%

Modality: Online

Evaluation Criteria	Percentage
S10 Participation (Forums and Supervised Activities)	10%
S2 Individual / Group Assignments	30%
S4 Final Exam (On-Site)	60%

Extraordinary Session

Modality: In-Person

Evaluation Criteria	Percentage
S2 Individual / Group Assignments	30%
S4 Final Exam (On-Site)	70%

Modality: Online

Evaluation Criteria	Percentage
S2 Individual / Group Assignments	30%
S4 Final Exam (On-Site)	70%

3.3. Restrictions

Minimum Grade
To be able to qualify for inclusion of the above evaluation criteria percentages in the calculation of the final grade, it is necessary to obtain at least a grade of 5.0 in the final test.

Attendance
Student who have missed more than 25% class meetings (unexcused) may be denied the right to take the final exam in the ordinary session.

Writing Standards
Special attention will be given to written assignments, as well as to exams, regarding both presentation and content in terms of grammatical and spelling aspects. Failure to meet the minimum acceptable standards may result in point deduction.

3.4. Plagiarism Warning

Nebrija University will not tolerate plagiarism under any circumstances. Reproducing content from sources other than a student's own work (the internet, books, articles, and peers' work, among others) without proper citation will be considered plagiarism.

If these practices are detected, they will be considered a serious offense, and the sanctions provided for in the Student Regulations may be applied.

4. BIBLIOGRAPHY

Required Reading

Bradley, T. (2013). *Essential Mathematics for Economics and Business* (4th ed.). Wiley.

Hoy, M., Livernois, J., McKenna, C., Rees, R., & Stengos, T. (2022). *Mathematics for economics.* MIT press

Sydsæter K., Hammond P. (with StrØm A.) (2012). *Essential Mathematics for Economic Analysis* (4th ed.). Pearson.

Recommended Reading

Gelfand I. M, Fomin S. V. (2000). *Calculus of Variations*. Dover Books on Mathematics.

Kaplan W., Lewis D. J. (2007). *Calculus and Linear Algebra (V.1).* University of Michigan Library.

McMullen, C. (2018). *Essential Calculus Skills Practice Workbook with Full Solutions.* Amazon print.