1. BASIC INFORMATION

Course	MATHEMATICS FOR ECONOMICS II
Degree program	ECONOMICS DEGREE
School	Economic, Business and Communication Sciences
Year	1st - First
ECTS	6
Credit type	Compulsory
Language(s)	English
Delivery mode	Presential
Semester	2nd Second
Academic year	2025-2026
Coordinating professor	Nuria Benavent Oltra

2. PRESENTATION

Mathematics for Economics II, extends the mathematical knowledge applied to economic problems and continues the formative itinerary followed in Mathematics for Economics I. Equations, scalar programming, theorems, continuing with optimization will be studied. Students will acquire skills to solve economic problems by means of advanced mathematical techniques, developing a solid quantitative base for their application in the field of economics.

3. COMPETENCIES AND LEARNING OUTCOMES

KNOWLEDGE:

CON02. Identify possible relevant data to provide solutions to scientific, sustainable and ethical problems through mathematical practice as a whole.

- Identify stability criteria for dynamic systems, quadratic functions and functions with separate variables.
- Summarise the economic interpreting of multipliers, as well as the usefulness of the Weierstrass theorem and the implication of coercivity for the existence of solutions to optimisation problems.

SKILLS:

HAB02. Solve problems and cases using data analysis techniques and tools to identify patterns, trends and predictions in economic decision-making.

- Use the Kuhn-Tucker multipliers method to solve problems with inequality constraints.
- Graphically draw mathematical problems of real functions over variables by means of problems posed.

- Use the Lagrange multiplier method to solve complex function problems.
- Solve programs with equality constraints, applying the substitution method and the Lagrange multiplier method, as well as production and diet planning problems.
- Assess the Kuhn-Tucker multiplier method for solving programs with inequality constraints.

COMPETENCIES:

COMP02. Use the necessary mathematical tools to solve problems using programming and analysis methods.
COMP04. Employ knowledge of econometric models and implement them through the use of data analysis and calculation tools.
COMP17. Calculate economic models identifying the different trends and impact on the economy.

4. CONTENT

1) Autonomous scalar equations and linear differential equations with constant coefficients. Linear difference equations applying stability criteria.
2) Linear programming. Simplex and two-phase methods. Normal economic problems of production and diet.
3) Post-optimal analysis.
4) Weierstrass theorem and coercive functions.
5) Lagrange multiplier method.
6) Optimization with inequality constraints using the method of multipliers and its interpretation.

5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Master class.
- Case method.
- Cooperative learning.
- Problem-based learning.
- Workshop-based learning.

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Learning activity	Number of hours

Master Classes	12
Practical application seminars	18
Case studies	14
Oral presentation of work	4
Preparation of reports and written papers	16
Research and projects	8
Independent work	56
Debates and colloquiums	8
Face-to-face assessment tests	12
TOTAL	**150**

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based mode:

Assessment system	Weight
Face-to-face evaluation tests	50%
Case/problem	30%
Laboratory/workshop practice notebook	20%

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

7.1. First exam period

To pass the course in the first exam period, you must obtain a final course grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 5.0 in the final exam in order to average in the final grade along with all the grades corresponding to the other activities.

7.2. Second exam period

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of 10 (weighted average).

In any case, you will need to obtain a grade of at 5.0 in the final exam in order to average in the final grade along with all the grades corresponding to the other activities.

The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course (*):

Assessable activities	Deadline
Activity 1- 2	Week 1 to 5
Activity 2- 4	Week 6 to 10
Activity 3- 5	Week 11 to 18
Face-to-face evaluation tests	Week 16-18

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

(*) Subject to changes depending on the type of Activity assessment implemented.

9. BIBLIOGRAPHY

The main reference work for this subject is:
Bierlaire, M. (2015). *Optimization: Principles and Algorithms*. EPFL Press.

The recommended Bibliography is:
Sethi, S. P., & Thompson, G. L. (2000). *Optimal Control Theory: Applications to Management Science and Economics* (2ª ed.). Springer.

10. EDUCATIONAL GUIDANCE AND DIVERSITY UNIT

From the Educational Guidance and Diversity Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.
 From this unit we offer to our students:
1. Accompaniment and follow-up by means of counselling and personalized plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunities for all students.
3. We offer students different extracurricular resources to develop different competences that will encourage their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us at:

orientacioneducativa@universidadeuropea.es

11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the "surveys" section in virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.