GUÍAS DOCENTES

Universidad de Jaén

FACULTY OF SOCIAL AND LEGAL SCIENCES

# Mathematical models of firms

2024-2025

Grado en Estadística y empresa

Acceso Mayores 40
Guías docentes UJA
Horarios de tutorías
Llamamientos PAU
Movilidad (Coordinador)
P.O.D.
Solicitud bilingüismo

# Syllabus 2024-25 - 11712002 - Mathematical Models of Firms (Modelos matemáticos en la empresa)

Caption
- Level 1: Tutorial support sessions, materials and exams in this language
- Level 2: Tutorial support sessions, materials, exams and seminars in this language
- Level 3: Tutorial support sessions, materials, exams, seminars and regular lectures in this language

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DEGREE: Grado en Estadística y empresa
FACULTY: FACULTY OF LAW AND SOCIAL SCIENCES
ACADEMIC YEAR: 2024-25
COURSE: Mathematical Models of Firms

## SYLLABUS

### 1. COURSE BASIC INFORMATION

NAME: Mathematical Models of Firms
CODE: 11712002 ACADEMIC YEAR: 2024-25
LANGUAGE: English LEVEL: 3
ECTS CREDITS: 6.0 YEAR: 4 SEMESTER: SC

### 2. LECTURER BASIC INFORMATION

NAME: GARCÍA ZAMORA, DIEGO
DEPARTMENT: U124 - MATEMÁTICAS
FIELD OF STUDY: 595 - MATEMÁTICA APLICADA
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WEBSITE: -
ORCID: -
LANGUAGE: - LEVEL: 3

### 3. CONTENT DESCRIPTION

Lesson 1: Approximation of functions. Taylor Polynomial and Artificial Intelligence.

Lesson 2: Difference Equations. Definition. Examples. Linear Difference Equations.

Lesson 3: Dynamical Systems. Definition. Examples and Applications. Equilibrium points.

Lesson 4: Discrete Matrix Models. Markov chains.

Lesson 5: Introduction to Differential Equations and their Applications. Continuous dynamic systems.

### 4. COURSE DESCRIPTION AND TEACHING METHODOLOGY

Lectures in large group (M1): Theoretical aspects of the subject will be developed as well as general practical examples that help to understand the theory.
Classes in practical groups (M6, M7): 15 face-to-face hours will be devoted to problem solving. The other 15 face-to-face hours will be devoted to practical classes with ICT.

Students with special educational needs should contact the Student Attention Service (Servicio de Atención y Ayudas al Estudiante) in order to receive the appropriate academic support

### 5. ASSESSMENT METHODOLOGY

Detailed breakdown of ratings:

- ASPECT S1. ATTENDANCE AND PARTICIPATION: 2 points (20 %). The student will receive the score proportional to the number of hours attended for active participation (which includes elaboration of exercises and practical cases). Learning outcome R5.
- ASPECT S2. THEORETICAL CONCEPTS OF THE SUBJECT: 2.0 points (20%): Written exam on theory and problems at the end of the term. Learning outcome R5. Likewise, a continuous evaluation system may be proposed to obtain the 2 points.

- ASPECT S3. PERFORMANCE OF WORK, CASES OR EXERCISES: 3 points (30%). Learning outcome R5.
- ASPECT S4. PRACTICES WITH COMPUTER: 3 points (30%). Learning outcome R5.

The final grade will be the sum of the grades obtained in each of the aspects mentioned in the evaluation system.

## 6. BOOKLIST (Access the bibliography in the Library catalog)

**MAIN BOOKLIST:**

- Course in mathematical modeling . Edition: -. Author: Mooney, Douglas D.. Publisher: The Mathematical Association of America (Library)
- Introducción al álgebra lineal : con aplicaciones en negocios, economía, ingeniería, física, ciencias de la computación, teoría de la aproximación, ecología, sociología, demografía y genética . Edition: 5ª ed. Author: Anton, Howard. Publisher: Limusa (Library)
- Ecuaciones diferenciales con aplicaciones de modelado. Edition: 8ª ed. Author: Zill, Dennis G. 1940-. Publisher: Thomson Editores (Library)
- Ecuaciones diferenciales y sus aplicaciones. Edition: -. Author: Braun, M.. Publisher: Grupo Editorial Iberoamericana (Library)
- Ecuaciones diferenciales . Edition: -. Author: Blanchard, Paul. Publisher: International Thomson (Library)

## 7. SUSTAINABLE DEVELOPMENT GOALS

Educación de calidad

**DETAILED INFORMATION**

This course contributes to Sustainable Development Goal 4, which seeks to ensure inclusive and equitable quality education and promote lifelong learning. It seeks to develop analytical skills and critical thinking through the study of function approximation, Taylor polynomials and artificial intelligence, preparing students for technological and economic challenges. Difference equations and dynamical systems help model real phenomena and understand complex systems, promoting practical problem solving and analytical thinking. Discrete matrix models teach how to organize and analyze information efficiently. Differential equations and system dynamics provide tools to solve problems in various disciplines, promoting simulation and prediction. Overall, the course offers an advanced and adaptable mathematical education, contributing to quality education and promoting lifelong learning.

## 8. VIRTUAL / CLASSROOM TEACHING SCENARIO

There is no modification in the methodology and activities, with the exception of using videoconferences if required.

There is no modification in the evaluation system nor in the weights.

The Faculty may establish rotating attendance depending on the number of students and the capacity of the classroom/laboratory.

## 9. VIRTUAL TEACHING SCENARIO

All activities will be conducted via videoconference.

Regarding the evaluation, all the aspects will be marked telematically. There is no other modification in the evaluation system nor in the weights.

## DATA PROTECTION CLAUSE (on line exams)

**Institution in charge of data processing:** Universidad de Jaén, Campus Las Lagunillas, s/n, 23071 Jaén

**Data Protection Delegate:** dpo@ujaen.es

**Purpose:** In accordance with the Universities Law and other national and regional regulations in force, carrying out exams and assessment tests corresponding to the courses students are registered in. In order to avoid frauds while sitting the exam, the exam will be answered using a videoconference system, being able the academic staff of the University of Jaén to compare and contrast the image of the person who is answering the exam with the student's photographic files. Likewise, in order to provide the exam with evidential content for revisions or claims, in accordance with current regulation frameworks, the exam will be recorded and stored.

**Legitimacy:** compliance with legal obligations (Universities Law) and other national and regional regulations currently in force.

**Addressees:** service providers who are the owners of the platforms where the exams are carried out and with whom the University of Jaén has signed the corresponding data access contracts.

**Storage periods:** those established in current in force regulations. In the specific case of exam videoconference recordings, not before the examination records and transcripts are closed or the exam can still be reviewed or challenged.

**Rights:** you can exercise your right of access, amendment, cancellation, opposition, suppression, limitation and portability by sending a letter to the postal or electronic address indicated above. In the event that you consider that your rights have been violated, you may submit a complaint to the Andalusian Council for Transparency and Data Protection www.ctpdandalucia.es

## CLASS RECORDING CLAUSE PERSONAL DATA PROTECTION

**Person in charge:** Universidad de Jaén, Paraje Las Lagunillas, s/n; Tel.953 212121; www.ujaen.es

**Data protection delegate (DPO):** TELEFÓNICA, S.A.U. ; Email: dpo@ujaen.es

**Procedure aim:** To manage proper recordings of teaching sessions with the aim of facilitating learning process under a multimodal and/or online teaching

**Period for record storage:** Images will be kept during legal term according to regulations in force

**Legitimacy:** Data will be managed according to legal regulations (Organic Law 6/2001, December 21, on Universities) and given consent provided by selecting corresponding box in legal admission documents

**Data recipients (transfers or assignments):** Any person allowed to get access to every teaching modality

**Rights:** You may exercise your rights of access, rectification, cancellation, portability, limitation of processing, deletion or, where appropriate, opposition. To exercise these rights, you must submit a written request to the Information, Registration and Electronic Administration Service of the University of Jaen at the address above, or by e-mail to the address above. You must specify which of these rights you are requesting to be satisfied and, at the same time, you must attach a photocopy of your ID card or equivalent identification document. In case you act through a representative, legal or voluntary, you must also provide a document that proves this representation and identification. Likewise, if you consider that your right to personal data protection has been violated, you may file a complaint with the Andalusian Data Protection and Transparency Council www.ctpdandalucia.es