GUÍAS DOCENTES

Universidad de Jaén

FACULTY OF SOCIAL AND LEGAL SCIENCES

Mathematics 2

2024-2025

Doble Grado en Derecho y Administración y Dirección de Empresas

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

Syllabus 2024-25 - 11812042 - Mathematics 2 (Matemáticas II)

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: Doble grado en Derecho y Administración y dirección de empresas
FACULTY: FACULTY OF LAW AND SOCIAL SCIENCES
ACADEMIC YEAR: 2024-25
COURSE: Mathematics 2

SYLLABUS

1. COURSE BASIC INFORMATION

NAME: Mathematics 2
CODE: 11812042 ACADEMIC YEAR: 2024-25
LANGUAGE: English LEVEL: 3
ECTS CREDITS: 6.0 YEAR: 2 SEMESTER: SC

2. LECTURER BASIC INFORMATION

NAME: HUERTAS ARMESTO, ANA
DEPARTMENT: U124 - MATEMÁTICAS
FIELD OF STUDY: 595 - MATEMÁTICA APLICADA
OFFICE NO.: B3 - 004 E-MAIL: mhuertas@ujaen.es P: 953211742
WEBSITE: -
ORCID: -
LANGUAGE: - LEVEL: 3

NAME: GUERRERO GARCIA, JULIO
DEPARTMENT: U124 - MATEMÁTICAS
FIELD OF STUDY: 595 - MATEMÁTICA APLICADA
OFFICE NO.: B3 - B3-035 E-MAIL: jguerrer@ujaen.es P: 953 213375
WEBSITE: -
ORCID: -
LANGUAGE: - LEVEL: 3

3. CONTENT DESCRIPTION

Differential and integral Calculus of several variables with applications to economics. Introduction to differential equations.

THEORETICAL CONTENTS

Unit 1. Limits and continuity of real-valued functions of several real variables . The space R^n. Real-valued functions of several real variables. Limits of real-valued functions of several real variables. Continuity of real-valued functions of several real variables.

Unit 2. Differentiability of real-valued functions of several real variables. Partial derivatives. Directional derivatives. Differential of real-valued functions of several real variables. Applications to economics.

Unit 3. Vector-valued functions of several real variables. Limits, continuity and differentiability of vector-valued functions. The Chain Rule. Homogeneous functions. Applications to economics.

Unit 4. Optimization of real-valued functions of several real variables. Quadratic forms. Unconstrained optimization. Optimization with equality constraints. Applications to economics.

Unit 5. Integration of real-valued functions of several real variables. Double integral construction. Double integrals over rectangular domains. Double integrals over general bounded regions.

Unit 6. Introduction to differential equations. Basic concepts and notation. Integration methods for some types of first and second order ordinary differential equations. Applications to economics.

PRACTICAL CONTENTS

Written exercises and computer sessions related to the theoretical contents.

4. COURSE DESCRIPTION AND TEACHING METHODOLOGY

Lectures (M1, M3, M4, M5): Theoretical contents and related practical examples will be developed in these sessions.

Seminars (M6, M7, M8, M10, M12, M13): 15 one-hour long classroom sessions will be devoted for solving problems, with special emphasis on applications to economics. Additionally, 15 one-hour long computer lab sessions will be devoted for solving problems by using the software Mathematica.

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

1. Detail:

S1. ACTIVE ATTENDANCE: 0 points (0%):

S2. THEORETICAL CONCEPTS: 7.5 points (75%): Final written exam about the theoretical concepts and related exercises.

S3. CLASSROOM EXERCISES AND PROJECTS: 0 points (0%):

Realization of individual and/or group projects with oral presentation to the rest of the class and/or realization of classrom exercises proposed by the professor.

S4. COMPUTER LAB PRACTICES: 2.5 points (25%): Computer exam. Computer guidelines may be used in the exam. Learning results R11 and R13.

Marks from S4 will be maintained during the current academic year. Students who attend the final written exam (S2) and/or the computer exam (S4) will appear as 'SHOWN' in the grade list for the corresponding official exam call.

The final grade will be the sum of the marks obtained from S2 and S4. This will be possible only when S2 has been passed. That is to say, if the mark is equal to or greater than 5. In another case, the final grade will be the mark obtained from S2.

For the English group the evaluation of S2 can be achieved during the course without the need of a final exam.

The skills and learning results obtained in each evaluation aspect are related in the following way:

Skill CE7ADE: Aspects (S2) (S4)
Skill CE9ADE: Aspects (S4)
Skill G14ADE: Aspect (S4)
Skill G3ADE: Aspects (S2) (S4)
Learning Result R11: Aspects (S2) (S4)
Learning Result R12: Aspect (S4)
Learning Result R13: Aspect (S2) (S4)
Learning Result R14: Aspects (S2) (S4)

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

MAIN BOOKLIST:

- Essential mathematics for economic analysis. Edition: 5th ed. Author: Sydsaeter, Knut. Publisher: Harlow : Pearson Education Limited, 2016 (Library)
- An Introduction to Mathematical Analysis for Economic Theory and Econometrics. Edition: -. Author: D. Corbae, M.B. Stinchcombe, J. Zeman. Publisher: Princeton University Press (Library)
- Further Mathematics for Economic Analysis. Edition: -. Author: K. Sydsaeter, P. Hammond, A. Seierstad. Publisher: Financial Times Prentice Hall (Library)

7. SUSTAINABLE DEVELOPMENT GOALS

Educación de calidad

DETAILED INFORMATION

SDG 4: Quality Education

Description: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Classroom Application:

- **Development of Analytical and Critical Skills:** Design projects that require the use of advanced mathematics to solve real-world problems. This helps students develop critical and analytical skills.
- **Open Educational Resources:** Create and share open educational resources (OERs) in advanced mathematics to make them available to a wider audience, promoting equitable access to quality education.

8. VIRTUAL / CLASSROOM TEACHING SCENARIO

TEACHING METHODOLOGIES AND FORMATIVE ACTIVITIES

Formative Activities (1)	Format (in person/Off-site) (2)	Teaching Methodology Description
30 theoretical sessions with the course content	Classrom based 25% - 50%	30 one-hour lectures, realized in the classroom and video streamed by videoconference to the rest of the group. Periodic rotation of in-person students.
15 computer lab sessions	Clasroom based 25% - 50%	15 one-hour practical sessions in computer lab, with periodic rotation of in-person students. Streamed by videoconference to the rest of the group.
15 tutorial sessions	Clasroom based 25% al 50%	15 one-hour tutorials (reduced groups, rotation of in-person students and streamed by videoconference to the rest of the group).
Office hours	Off-site	Office hours will be online using videoconference or email.

(1) In the off-site scenerio, course lecturers reserve the right to refuse the recording, transmission or reproduction of its image, voice and speech during their lectures at Universidad de Jaén.

(2) The Faculty is responsible for fixing the ratio of in-person and off-site students when the final number of them and the assigned lecture room are known.

EVALUATION SYSTEM

Evaluation test	Format (in-person/off-site sincronous o asincronous)	Description	Percentage
(S2) Final written exam	In person	Final written exam with theoretical and practical content.	60 %
(S3) Realization of a project with applications of the theoretical contents.	Off-site	Structure of the project. Quality of the document. Exposition to the professor and/or classroom.	10%
(S4.1) Computer lab exercises with Mathematica.	In-person/Off-site	Two evaluation computer based tests (one for chapters 1, 2 y 3 and another for 4, 5, 6)	10%
(S4.2) Computer lab exercises with Mathematica.	In-person	Final exam at the end of the semester	20%

RESOURCES

- Basic and complementary bibliography contain electronic bibliographic resources at disposal in the university library.
- Resources needed for off-site follow-up of masterclass lectures, tutorials, realization of classrom exercises, ... (Google Meet, Google Form, YouTube, Docencia Virtual, ...)
- Tablets and/or 2-in-1 laptops, substituting the blackboard, to use during videoconferences.
- Self-evaluation tests designed by the course lecturers.
- Software of own design for the random generation of unique exams from a large database of questions.
- Students should install at home the software Mathematica for the off-site realization of computer exercises.
- Students should fulfill the technical requirements for the correct realization of distance exams. This includes: laptop, webcam, microphone and the required software. Course lecturers will inform of the video and audio recording of the videoconference exams using Google Meet, to guarantee the transparency of the process.

9. VIRTUAL TEACHING SCENARIO

TEACHING METHODOLOGIES AND FORMATIVE ACTIVITIES

Formative Activities (1)	Format (in person/Off-site)	Teaching Methodology Description
30 theoretical sessions with the course content	Off-site	30 one-hour lectures streamed by videoconference.
15 computer lab sessions	Off-site	15 one-hour practical sessions by videoconference.
15 tutorial sessions	Off-site	15 one-hour tutorials by videoconference.
Office hours	Off-site	Office hours will be online using videoconference or email.

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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