GUÍAS DOCENTES

Universidad de Jaén

School of Engineering of Jaén

Analysis and numerical methods

2024-2025

Grado en Ingeniería Informática (E.P.S. Jaén)

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

Syllabus 2024-25 - 13311002 - Analysis and Numerical Methods (Análisis y métodos numéricos)

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

Back | Full version (Spanish) | English

DEGREE: Grado en Ingeniería informática
FACULTY: SCHOOL OF ENGINEERING OF JAÉN
ACADEMIC YEAR: 2024-25
COURSE: Analysis and Numerical Methods

SYLLABUS

1. COURSE BASIC INFORMATION

NAME: Analysis and Numerical Methods
CODE: 13311002 ACADEMIC YEAR: 2024-25
LANGUAGE: English LEVEL: 3
ECTS CREDITS: 6.0 YEAR: 1 SEMESTER: PC

2. LECTURER BASIC INFORMATION

NAME: MANZANO PREGO, JOSÉ MIGUEL
DEPARTMENT: U124 - MATEMÁTICAS
FIELD OF STUDY: 595 - MATEMÁTICA APLICADA
OFFICE NO.: B3 - 013 E-MAIL: jmprego@ujaen.es P: 953213533
WEBSITE: http://www4.ujaen.es/~jmprego/
ORCID: -
LANGUAGE: - LEVEL: 3

3. CONTENT DESCRIPTION

Mathematical Analysis: The field of Real Numbers. The complex numbers. Sequences and series of real numbers. Differentiation and integration of real functions of one real variable. Introduction to functions of several variables. Introduction to ordinary differential equations. **Numerical Methods:** Introduction to Numerical Calculus. Resolution of numerical equations. Interpolation. Numerical integration. Numerical resolution of ordinary differential equations.

Mathematical Analysis:

- Real numbers.
- Complex numbers.
- Sequences of real numbers.
- Real functions of real variables.
- Differentiation of real functions of one real variable.
- Integration of real functions of one real variable.
- Series of real numbers.
- Introduction to real functions of several real variables.
- Introduction to ordinary differential equations.

Numerical methods:

- Introduction to Numerical Calculus.
- Interpolation of real functions.
- Numerical resolution of non-linear equations.
- Numerical integration of real functions.
- Numerical resolution of ordinary differential equations

Practice Program (topics to be chosen among the following):

- Introduction to Mathematica and/or Python.
- Real and complex numbers. Inequalities. Absolute value.
- Sequences of real numbers.
- Real functions of real variables.
- Differentiation of real functions of one real variable.
- Integration of real functions of one real variable.
- Series of real numbers.
- Introduction to real functions of several real variables.
- Introduction to ordinary differential equations.
- Introduction to Numerical Calculus.
- Interpolation of real functions.
- Numerical resolution of non-linear equations.
- Numerical integration of real functions.
- Numerical resolution of ordinary differential equations.

4. COURSE DESCRIPTION AND TEACHING METHODOLOGY

Theoretical lectures in large groups (30 hours attendance and 45 hours of autonomous work) and practical tutorials in small groups (30 hours attendance and 45 hours of autonomous work), including problem solving sessions and computer lab sessions.

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.

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

Attendance and active participation will be evaluated, mainly in the practical classes. This will account for the competences CB1R and CB5R (10%).

A final examination of the whole subject will be done in a normal classroom where problem-solving procedures will be evaluated (60%).

There will also be a test in the computer lab where students are allowed to use notes, books, calculator and mathematical software to solve problems and exercises. Here the accuracy of the results will be evaluated.

In any of the evaluation tests, it will be possible to ask questions about any subject of the course and the competences CB1R, CB5R and CBB1R will be evaluated, as well as the results R1 and R2.

In the case of the PATIE group (taught in English) or in the event of small groups, the final exam and the computer-based tests might be substituted with a continuous assessment during the course as explained in the rest of this paragraph. Participation in class plus individual exercises will account for the 10% of the final marks (item S1 related to active participation). Also, the final exam will be split into two or three partial exams, each of which will represent 30% or 20% of the final marks (item S2). The last 30% of the total marks corresponds to exercises and/or projects (item S3) and will be assessed via programming exercises concerning numerical methods and the implementation of numerical functions using Python.

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

MAIN BOOKLIST:

- Numerical methods for engineers: with programming and software applications. Edition: -. Author: Chapra, Steven C.. Publisher: McGraw-Hill (Library)

7. SUSTAINABLE DEVELOPMENT GOALS

Educación de calidad

DETAILED INFORMATION

Goal 4. Quality Education: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Encourage analytical skills and critical thinking by incorporating the use of mathematics in modeling and objectively solving real-life problems.

8. VIRTUAL / CLASSROOM TEACHING SCENARIO

eaching methodology and training activities

ACTIVITIES	FORMAT (FACE-TO-FACE/ONLINE)	DESCRIPTION
Theoretical Sessions	50%	Class in the schedule and classroom assigned to a part of the group and retransmission by videoconference to the rest, with periodic rotation of students, as determined by the Center. 30 hours.
Practical Sessions	50%	Class in the schedule and classroom assigned to a part of the group and broadcast by videoconference to the rest, with periodic rotation of students, as determined by the Center. 30 practical sessions, of one hour each, some of them in the computer lab.
Office hours	Online	Google Meet

The Centre may vary the percentage of attendance depending on the number of students nd the capacity of the classroom/laboratory in accordance with health measures. In case of ess than 100% attendance, there will be a periodic rotation of students as determined by the enter.

n the multimodal and/or non-attendance scenario, when appropriate, the teaching staff nvolved in teaching reserves the right not to give consent for the capture, publication, etransmission or reproduction of their speech, image, voice and explanations of the chair, in he exercise of their teaching duties, in the scope of the University of Jaén.

ssessment System

TEST	FORMAT	DESCRIPTION	PERCENTAGE
Attendance and participation	Face-to-face/online synchronous	Evaluation of the oral/written participation	10%
Written test	Face-to-face/online synchronous	Theoretical-practical exam (short answers and practical cases)	60%
Works, cases and exercises	Online	Submission and exposition of the solved cases	15%
Exercises with the software Mathematica or Python	Face-to-face/online	Continuous assessment	15%

9. VIRTUAL TEACHING SCENARIO

Teaching methodology and training activities

ACTIVITIES	FORMAT (FACE-TO-FACE/ONLINE)	DESCRIPTION
30 Theoretical Sessions	Online	30 hours via videoconference.
30 Practical Sessions	Online	30 hours via videoconference.
Office hours	Online	Google Meet

Assessment System

TEST	FORMAT	DESCRIPTION	PERCENTAGE
Attendance and participation	online synchronous	Evaluation of the oral/written participation	10%
Written test	online synchronous	Theoretical-practical exam (short answers and practical cases)	60%
Works, cases and exercises	online synchronous	Submission and exposition of the solved cases	15%
Exercises with the software Mathematica or Python	online	Continuous assessment	15%

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