

* 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

| DEGREE: | Grado en Ingeniería mecánica (13411002) |
|----------|--|
| FACULTY: | SCHOOL OF ENGINEERING OF JAÉN |
| DEGREE: | Doble grado en Ingeniería eléctrica e Ingeniería mecánica (13611002) |
| FACULTY: | SCHOOL OF ENGINEERING OF JAÉN |
| DEGREE: | Grado en Ingeniería de organización industrial (13011002) |
| FACULTY: | SCHOOL OF ENGINEERING OF JAÉN |
| DEGREE: | Doble grado en Ingeniería mecánica e Ingeniería de |
| | organizacion industrial (13811002) |
| FACULTY: | SCHOOL OF ENGINEERING OF JAEN |
| DEGREE: | Doble grado en Ingeniería eléctrica e Ingeniería |
| | |
| FACULIY: | SCHOOL OF ENGINEERING OF JAEN |
| DEGREE: | Doble Grado en Ingeniería mecánica e Ingeniería electrónica industrial (13911010) |
| FACULTY: | SCHOOL OF ENGINEERING OF JAEN |
| DEGREE: | Grado en Ingeniería electrónica industrial (13111002) |
| FACULTY: | SCHOOL OF ENGINEERING OF JAÉN |
| DEGREE: | Grado en Ingeniería eléctrica (13511002) |
| FACULTY: | SCHOOL OF ENGINEERING OF JAÉN |
| ACADEMIC | 2024-25 |
| YEAR: | |
| COURSE | Advanced Mathematics |

SYLLABUS

1. COURSE BASIC INFORMATION

NAME: Advanced Mathematics CODE: 13411002 (*) LANGUAGE: English ECTS CREDITS: 6.0

YEAR: 2

ACADEMIC YEAR: 2024-25 LEVEL: 3 SEMESTER: PC

2. LECTURER BASIC INFORMATION

NAME: HUERTAS ARMESTO, ANA DEPARTMENT: U124 - MATEMÁTICAS



Universidad de Jaén

FIELD OF STUDY: 595 - MATEMÁTICA APLICADA E-MAIL: mhuertas@ujaen.es **OFFICE NO.: B3 - 004** P: 953211742 WEBSITE: -ORCID: -LEVEL: 3 LANGUAGE: English NAME: LÓPEZ MORENO, ANTONIO JESÚS DEPARTMENT: U124 - MATEMÁTICAS FIELD OF STUDY: 595 - MATEMÁTICA APLICADA **OFFICE NO.: B3 - 28** E-MAIL: ajlopez@ujaen.es P: 953212932 WEBSITE: www4.ujaen.es/~ajlopez ORCID: https://orcid.org/0000-0001-6701-7550 LANGUAGE: English LEVEL: 3 NAME: ROSALES RODENAS, Mª CONSUELO DEPARTMENT: U124 - MATEMÁTICAS FIELD OF STUDY: 595 - MATEMÁTICA APLICADA E-MAIL: mrosales@ujaen.es OFFICE NO.: B3 - 005 P: 953212417 WEBSITE: -ORCID: https://orcid.org/0000-0002-5333-507X LEVEL: 3 LANGUAGE: English

3. CONTENT DESCRIPTION

Theoretical contents

Chapter 1 : Introduction to the Functions of Several Variables. Topology of the Euclidean Space. Limits of multivariate functions. Differentiation of multivariate functions. Chain rule. Implicit function theorem. Extrema of multivariate functions.

Chapter 2: Differential Geometry.

Parameterized curves. Frenet frame. Parameterized surfaces.

Chapter 3: Multivariate integration.

Integration for functions o two variables. Integration for functions of three variables.

Chapter 4: Line and Surface integral. Line integral. Surface integral. Integral theorem of vector calculus.

Chapter 5: Partial differential equations. Basic concepts. Fourier Series. Classical partial differential equations.

Practices content

In the practices classes the software Wolfram Research Mathematica will be used to present and follow the concepts of the subject along with exercises, visual examples and techniques to implement them.



4. COURSE DESCRIPTION AND TEACHING METHODOLOGY

45 hours of regular classes in classroom. The CB1R and CBB1R competencies and R12 result will be developed. 15 hours of classes in computer classroom under the supervision of professor. The CB1R competency and R12 result will be developed.

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

S2) Theoretical/practical exam (75%). Written exam at the end of the semester.

S3) Presentation of additional works and/or exercises (10%). In this item the students could obtain from 0 to 1 points for the individual or group works proposed by the professor. These works have to be presented before the exam of the official call "Ordinaria 1". The features of the works and the composition of the groups will be announced by the professor along the semester and could involve interdisciplinary student teams and topics. The mark obtained for item (S3) will be kept for all the official examination calls along the course.

S4) Practices in the computers classroom and new technologies (15%). This item will be evaluated by means of an exam that will be programmed by the professors along the regular period of classes.

To compute the final mark, the following items will be taken into account:

- * The mark obtained for item (S4) in the exam call "Ordinaria II" will be kept for the rest of official calls of the course. In the call "Extraordinaria II" the students will be able to repeat the practices exam but only the last mark obtained will be considered.
- * The professor could propose a continuous assessment system by means of which the students could obtain the 7.5 point of item (S2) along the semester. Those students who participate in the continuous assessment system will have as final mark the one obtained along the semester even though they don't attend the final exam of the official call. On the other hand, those who couldn't pass the subject in the continuous assessment system will have access to the final exam and they will evaluated in the terms expressed before in items (S2)-(S4). The final mark of the students that do not participate in the continuous assessment system and do not attend the final exams of each call will be "No presentado".
- * The final mark will be the sum of the points obtained in items (S2)-(S4), provided that the student obtain a minimum of 5 points (out of 10) in (S2). Otherwise, when the student obtains less than 5 points in (S2), the final official mark will be the one obtained in (S2) and the rest of items, (S3) and (S4), will not be considered.

Competencies evaluated by S2): CB1, CBB1R, R12 Competencies evaluated by S3): CB1, CBB1R, R12 Competencies evaluated by S4): CB1, CBB1R, R12

6. BOOKLIST

MAIN BOOKLIST:

- * Cálculo : varias variables Jon Rogawski ; versión española traducida por Gloria García García, revisada por Martín Jimeno Jiménez. Edition: 2ª ed. orig.. Author: Rogawski, Jon. Publisher: Reverte
- * Div, grad, curl and all that: an informal text on vector calculus. Edition: 3rd ed. Author: Schey, H. M.. Publisher: Norton and Company

ADDITIONAL BOOKLIST:





- * Advanced engineering mathematics . Edition: -. Author: Zill, Dennis G., 1940- author.. Publisher: Jones and Bartlett Learning
- * Student solutions manual for mathematical methods for physics and engineering K. F. Riley, M. P. Hobson. Edition: 3rd ed.. Author: Riley, Kenneth Franklin. Publisher: Cambridge University Press,
- * Advanced engineering mathematics . Edition: -. Author: Zill, Dennis G., 1940- author.. Publisher: Jones and Bartlett Learning

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

1) TEACHING METHODOLOGY AND ACTIVITIES

| Teaching activities | Format (on-site/on-line) | Teaching methodolay Description |
|-----------------------------------|-----------------------------|---|
| | | reaching methodolgy. Description |
| A1- Classes of theory for all the | On-site/on-line | Half of the grupe will attend the |
| group (big group) | rotary 50% ^(*) | classes on-site as scheduled in the program of the subject and the other half on-line by videoconference with periodic rotation of the students between on-line and on-site as determined by the Faculty and professors |
| A2- C lasses in small groups | On-site 100% ^(*) | On-site classes as scheduled in the program of the subject. |

(*) The Faculty could establish a different per cent for the activities depending on the number of students, the capacity of the classrooms and the sanitary measures in force.

2) ASSESMENT SYSTEM

| ITEM | CRITERIA | TOOL | WEIGHT |
|--------------------------------|---|--|--------|
| Attendance/ participation | Active participation in the | Professor's observations | 15% |
| (S1) | classroom and tutoring hours both face-to-face and on-line. | and notes | |
| Theory/ Practices exam (S2) | Mastery of the theoric and practic contents of the subject | Theory/Practices Exam. Fade-to-face modality preferably. | 75.0% |
| Works/ exercises (S3) | Delivery of the proposed problems. The professors will consider: | Proposed work afted the practices. | 10.0% |





| development, | | | |
|---------------|-----------------------------|-----|--|
| documer | documentation, originality, | | |
| correct | spelling | and | |
| presentation. | | | |

3) RESOURCES

For the on-line teaching, computer, tablet or mobile phone with internet connection and Mathematica softwared installed is required. A document scanning application will be also necessary. Besides, we will make use of the Docencia Virtual system of the University of Jaén as well as the Google tools offered by the University of Jaén. As well, classes video recording software will be used.

Moreover, the bibliographic electronic resources abailable through the Library of the University of Jaen will be employed.

9. VIRTUAL TEACHING SCENARIO

1) TEACHING METHODOLOGY AND ACTIVITIES

| Teaching activities | Format (in-site/on-site) | Teaching methodolgy. Description |
|-----------------------------------|--------------------------|-------------------------------------|
| A1- Classes of theory for all the | On-site 100% | On-site classes as scheduled in the |
| group (big group) | | program of the subject. |
| A2- C lasses in small groups | On-site 100% | On-site classes as scheduled in the |
| | | program of the subject. |

2) ASSESMENT SYSTEM

| ITEM | CRITERIA | TOOL | WEIGHT |
|-----------------------------------|--|--|--------|
| Attendance/ participation (S1) | Active participation in the classroom and tutoring hours both face-to-face and on-line. | Professor's observations and notes | 15% |
| Theory/ Practices exam (S2) | Mastery of the theoric and practic contents of the subject | Theory/Practices Exam. Fade-to-face modality preferably. | 75.0% |
| Works/ exercises (S3) | Delivery of the proposed problems. The professors will consider: development, documentation, originality, correct spelling and presentation. | Proposed work afted the practices. | 10.0% |

3) RESOURCES

For the on-line teaching, computer, tablet or mobile phone with internet connection and Mathematica softwared installed is required. A document scanning application will be also necessary. Besides, we will make use of the Docencia Virtual system of the University of Jaén as well as the Google tools offered by the University of Jaén. As well, classes video recording software will be used.

Moreover, the bibliographic electronic resources abailable through the Library of the University of Jaen will be employed.



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

