



Universidad de Jaén

School of Engineering of Jaén

Machine mechanics

2024-2025

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

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

Grado en Ingeniería electrónica industrial (E.P.S. Jaén)

Grado en Ingeniería de organización industrial (E.P.S. Jaén)

Doble Grado en Ingeniería eléctrica e Ingeniería mecánica (E.P.S. Jaén)

Doble Grado en Ingeniería eléctrica e Ingeniería electrónica industrial (E.P.S. Jaén)

Doble Grado en Ingeniería mecánica e Ingeniería electrónica industrial (E.P.S. Jaén)

Doble Grado en Ingeniería mecánica e Ingeniería de organización industrial (E.P.S. Jaén)



GRUPO



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

Syllabus 2024-25 - 13412017 - Machine Mechanics (Mecánica de máquinas)

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 mecánica (13412017)
FACULTY:	SCHOOL OF ENGINEERING OF JAÉN
DEGREE:	Doble grado en Ingeniería mecánica e Ingeniería de organización industrial (13812023)
FACULTY:	SCHOOL OF ENGINEERING OF JAÉN
DEGREE:	Doble grado en Ingeniería eléctrica e Ingeniería electrónica industrial (13712027)
FACULTY:	SCHOOL OF ENGINEERING OF JAÉN
DEGREE:	Grado en Ingeniería electrónica industrial (13112021)
FACULTY:	SCHOOL OF ENGINEERING OF JAÉN
DEGREE:	Grado en Ingeniería eléctrica (13512019)
FACULTY:	SCHOOL OF ENGINEERING OF JAÉN
DEGREE:	Grado en Ingeniería de organización industrial (13012017)
FACULTY:	SCHOOL OF ENGINEERING OF JAÉN
DEGREE:	Doble grado en Ingeniería eléctrica e Ingeniería mecánica (13612023)
FACULTY:	SCHOOL OF ENGINEERING OF JAÉN
DEGREE:	Doble Grado en Ingeniería mecánica e Ingeniería electrónica industrial (13912027)
FACULTY:	SCHOOL OF ENGINEERING OF JAÉN
ACADEMIC YEAR:	2024-25
COURSE:	Machine Mechanics

SYLLABUS

1. COURSE BASIC INFORMATION

NAME: Machine Mechanics	
CODE: 13412017 (*)	ACADEMIC YEAR: 2024-25
LANGUAGE: English	LEVEL: 1
ECTS CREDITS: 6.0	YEAR: 2
	SEMESTER: PC

2. LECTURER BASIC INFORMATION

NAME: LÓPEZ ALBA, ELIAS	
DEPARTMENT: U121 - INGENIERÍA MECÁNICA Y MINERA	
FIELD OF STUDY: 545 - INGENIERÍA MECÁNICA	
OFFICE NO.: A3 - A3-020	E-MAIL: elalba@ujaen.es
	P: 953212862
WEBSITE: -	
ORCID: https://orcid.org/0000-0002-3138-1366	
LANGUAGE: -	LEVEL: 1

3. CONTENT DESCRIPTION

BLOCK 1. INTRODUCTION AND STATIC OF PARTICLE.

ITEM 1. Introduction to vector mechanics.

- 1.1. Introduction.
- 1.2. The mechanics in mechanical engineering.
- 1.3. Basic trigonometric.

ITEM 2. Static of particles.

2.1. Addition and decomposition of forces.

2.2. Balance and Newton's first law.

BLOCK 2. STATICS IN SOLIDS, STRUCTURES AND MACHINES.

ITEM 3. Mechanical effect of forces on a solid. System forces.

3.1. Mechanical effect of a force on a solid.

3.2. Torque.

3.3. Solving systems of forces.

ITEM 4. Statics of rigid bodies.

4.1. Equilibrium of rigid bodies in three dimensions.

4.2. Flat balance problems.

4.3. Calculating the resultant of the internal forces in a section of the solid.

ITEM 5. Static mechanical systems. Structures and machines.

5.1. Equilibrium systems formed by different solid link.

5.2. Fundamentals of structural analysis.

5.3. Analysis of forces in machines and structures.

BLOCK 3. MOMENTS FIRST AND SECOND ORDER.

ITEM 6. Centre of gravity, mass and centroid.

6.1. Centroid of a solid.

6.2. Moments of the first order. Calculating centroids.

6.3. Applications of the moments of first and second order.

ITEM 7. Moments of inertia of flat surfaces.

7.1. Second-order moments or inertia.

7.2. Introduction to applications of the moments of inertia strength calculation.

7.3. Products of inertia. Principal axes of inertia.

7.4. Applications Mohr Circle.

ITEM 8. Moments of inertia.

8.1. Second-order moments mass. Moments of inertia about axis.

8.2. Introduction to the main and inertia ellipsoid axes.

BLOCK 4. APPLICATIONS OF FRICTION AND ENERGY ISSUES.

ITEM 9. Friction. Applications.

9.1. Dry or Coulomb friction.

9.2. Rolling resistance.

9.3. Wheel static analysis.

ITEM 10. Energy and balance.

10.1. Virtual work.

10.2. Mechanical performance.

10.3. Potential and energy balance.

BLOCK 5. FUNDAMENTALS OF SOLID DYNAMICS.

ITEM 11. Dynamics of the particle.

11.1. Basics Kinematics.

11.2. Basics Kinetics.

11.3. Energy.

ITEM 12. Mechanics of particle systems.

12.1. Impulsive movement and collisions between particles.

12.2. Mechanics of particle systems.

12.3. Application of the theorem of conservation of angular momentum variable mass systems.

ITEM 13. Kinematics of rigid body.

13.1. Fundamental concepts of kinematics solid.

13.2. Basic movements of a solid.

13.3. Plane motion of a solid.

13.4. Plane motion of a mechanical system.

13.5. Introduction to the general movement of the rigid solid.

4. COURSE DESCRIPTION AND TEACHING METHODOLOGY

Lecture (Theory): 3	Hours per week
Lecture (Practice): 2	Hours per week
Seminars: 1	Hours per week
Homework: 3	Hours per week

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

Test. To get 5 points over 10.

6. BOOKLIST ([Access the bibliography in the Library catalog](#))**MAIN BOOKLIST:**

- Vector Mechanics for Engineers: Statics. Edition: -. Author: Ferdinand P. Beer, E. Russell Johnston, JR. David Mazurek, Elliot R. Eisenberg. ([Library](#))

ADDITIONAL BOOKLIST:

- Mecánica para ingenieros. Edition: 4ª ed., sistema internacional. Author: Shames, Irving H.. Publisher: Madrid [etc.]: Prentice-Hall, 1998-1999 ([Library](#))

7. SUSTAINABLE DEVELOPMENT GOALS

Industria, innovación e infraestructura

DETAILED INFORMATION

This subject promotes objective 9, related to industry and innovation, which promotes inclusive and sustainable industrialisation, where the environment is respected.

8. VIRTUAL / CLASSROOM TEACHING SCENARIO

- METODOLOGÍA DOCENTE Y ACTIVIDADES FORMATIVAS

Actividades formativas	Formato (presencial/online)	Metodología docente - Descripción
A1 Lectures in large rotating	Presence Group	Class to all students in the group in the assigned

.	50% (*)	schedule and classroom. The basic concepts of the subject will be taught through multimedia presentations, theoretical exhibitions and the realization of examples and /or problems/cases
A2 - Classes in small group .	Presence 100%	Class to all students in the group in the assigned schedule and classroom. Certain content will be explored through activities involving the practical application of knowledge acquired in the theory sessions.

■ SISTEMA DE EVALUACIÓN

Convocatoria ordinaria

ASPECTO	CRITERIOS	INSTRUMENTO	PESO
Theoretical concepts of the subject Written proof..	Mastery of theoretical-practical content.	A minimum score of 4.5 points out of 10 must be reached in order to pass the subject	80%
Laboratory practices/field/use of ICT tools.	Correct resolution of laboratory and/or computer practice sessions.	Report collecting the resolution of the various practice sessions by the student. It is necessary to submit all the practice reports on the dates indicated by the teacher in order to approve the subject. The failure to deliver the reports on the dates set by the teacher will imply that the student does not pass the subject.	10 %
Complementary activities Correct resolution of the proposed activities.	The activities proposed by the teacher are designed to complement the mastery of theoretical-practical content on the part of the student. It has a voluntary character but it is convenient to complete if the student wants to qualify for the full weighting of the aspects that make up the subject.	Complementary activities Correct resolution of the proposed activities.	5%

Student attendance and participation	Student attendance and participation	Student attendance and participation	5%
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Convocatoria extraordinaria

ASPECTO	CRITERIOS	INSTRUMENTO	PESO
Theoretical concepts of the subject Written proof..	Mastery of theoretical-practical content.	A minimum score of 4.5 points out of 10 must be reached in order to pass the subject	80%
Laboratory practices/field/use of ICT tools.	Correct resolution of laboratory and/or computer practice sessions.	Report collecting the resolution of the various practice sessions by the student. It is necessary to submit all the practice reports on the dates indicated by the teacher in order to approve the subject. The failure to deliver the reports on the dates set by the teacher will imply that the student does not pass the subject.	10 %
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Student attendance and participation	Student attendance and participation	Student attendance and participation	5%

Note: For those students who have not participated during the 2023/2024 course in the aforementioned continuous evaluation activities, the evaluation of the extraordinary call II will be made based on the final grade of the exam of the subject consisting of a written test.

3) RESOURCES

The following shall be used as synchronous resources:

- Conducting tutorials by videoconference.

The following shall be used as asynchronous resources:

- Facilitation of syllax presentations and exercise resolution through virtual teaching platform.
- Creation of doubt consultation tools using the virtual teaching platform.

9. VIRTUAL TEACHING SCENARIO

- METODOLOGÍA DOCENTE Y ACTIVIDADES FORMATIVAS

Actividades formativas	Formato (online)	Metodología docente - Descripción
A1 - Exhibitions in large online group	Online	The exhibitions in person are replaced by synchronous or asynchronous sessions depending on the concepts that are taught. The asynchronous modality will consist of the facilitation of the study of material developed and manuscriptd by the teacher that additionally contains comments and / or descriptions of the different theoretical concepts of the subject's syllabus that are an ideal complement in the development of the teaching sessions. Since the concepts developed in this subject are completely new for study and of remarkable complexity, it is considered that the complementation of the synchronous and asynchronous modalities may be a more than convenient way for the correct understanding and understanding of theoretical concepts by the student. At the same time, the student has multimedia presentations for each topic that are facilitated at the beginning of the delivery of them.
A2 - Small Online Group Classes	Online	As far as internship sessions are concerned, in the same way as in the case of theory

		sessions, they can combine the synchronous and asynchronous modalities. In the case of the asynchronous mode online classes for each of the sessions in order that the student can carry out a correct follow-up of them. In addition, a guide will be provided describing in detail all the steps to be taken for the execution of the different practices
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■ SISTEMA DE EVALUACIÓN

Convocatoria ordinaria

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Complementary activities Correct resolution of the proposed activities.	The activities proposed by the teacher are designed to complement the mastery of theoretical-practical content on the part of the student. It has a voluntary character but it is convenient to complete if the student wants to qualify for the full weighting of the aspects that make up the subject.	Complementary activities Correct resolution of the proposed activities.	5%
Student attendance and participation	Student attendance and participation	Student attendance and participation	5%

Note: For those students who have not participated during the 2023/2024 course in the aforementioned continuous evaluation activities, the evaluation of the extraordinary call II will be made based on the final grade of the exam of

the subject consisting of a written test.

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ASPECTO	CRITERIOS	INSTRUMENTO	PESO
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Laboratory practices/field/use of ICT tools.	Correct resolution of laboratory and/or computer practice sessions.	Report collecting the resolution of the various practice sessions by the student. It is necessary to submit all the practice reports on the dates indicated by the teacher in order to approve the subject. The failure to deliver the reports on the dates set by the teacher will imply that the student does not pass the subject.	10 %
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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

