Academic Year/course: 2024/25

30112 - Mechanics

Syllabus Information

Academic year: 2024/25
Subject: 30112 - Mechanics
Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia
179 - Centro Universitario de la Defensa - Zaragoza
Degree: 425 - Bachelor's Degree in Industrial Organisational Engineering
563 - Bachelor's Degree in Industrial Organisational Engineering
ECTS: 6.0
Year: 2
Semester: First semester
Subject type: Compulsory
Module:

1. General information

The general objective of the course is to train graduates specifically prepared to carry out the analysis of machines, mechanisms and mechanical systems, which implies that they should be able to understand a wide range of physical phenomena and develop both creative and develop both creative skills in technological design, as well as analytical and problem-solving abilities that allow the application of the acquired knowledge.

2. Learning results

1. Knowledge of movement composition.

2. Definition and identification of the motion parameters of a mechanical system and its degrees of freedom.

3. Understanding and application of the forces generated in the interaction between solids in mechanical systems.

4. Understanding and application to mechanical systems of the concepts of center of masses and inertia tensor.

5. Application of vector theorems to mechanical systems and interpretation of the results obtained.

6. Knowledge and application of mechanical systems modeling software

3. Syllabus

DEFENSE PROFILE.

Unit 1. Introduction. Vector calculus and equivalent force-par systems.

Unit 2. Static. Equilibrium conditions. Distributed forces. Friction.

Unit 3. Kinematics. Types of movement. Flat movement. Relative motion. Three-dimensional movement. Movement on Earth.

Unit 4. Mass geometry. Inertia tensor. Steiner's theorem. Composite bodies.

Unit 5. Dynamics. Dynamic variables. Fundamental theorems. Three-dimensional movement.

Unit 6. Machine theory. Design. Motion transmission. Degrees of freedom.

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Unit 1. Structural Analysis of Flat Mechanisms

Unit 2. Kinematic Analysis of Flat Mechanisms

Unit 3. Dynamic Analysis of Flat Mechanisms

Unit 4. Kinematic Analysis of Gears and Gear Trains

Unit 5. Mechanical Vibration Theory

4. Academic activities

DEFENSE PROFILE.

Lectures [27 hours]: sessions to develop the content of the subject.

Practical classes [24 hours]: problem solving sessions and simple case studies.

Computer simulations [4.5 hours]: sessions on the use of computer programs to solve mechanical problems . There will be three sessions of 1.5 hours each.

Evaluation tests [4.5 hours]: theoretical and practical tests of continuous assessment.

Study and personal work. Tutorials. [90 hours].

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In order to carry out the time distribution, we use as a measure the teaching week, in which the students must dedicate a total of **10 hours/week** to the study of the subject.

- Theory classes and examples (2h/week): sessions to develop the content of the subject.
- Problem-solving classes [1h/week]: solving problems of varying complexity.
- Practical classes with software [1h/week]: solution with mechanism analysis software.
- Tutored activities (2h/week)
- Study and preparation of evaluation tests [2 hours/week]
- Resolution of continuous assessment exercises [2 hours/week]

5. Assessment system

DEFENSE PROFILE.

First call with continuous assessment and global assessment . Second call with global assessment. Only the grades of the computer simulation exercises will be kept between differentcalls.

First call for continuous assessment**.**

Theoretical-practical part (80%): two written exams with problems and theoretical-practical questions. First exam on topics 1, 2 and 3. Second exam on topics 4, 5 and 6. This part will be graded by the average of both exams, subsequently weighted with a weight of 80%.

Part of computer simulations (20%) consisting of three practice sessions including quizzes. This part will be graded by the average of the three sessions, subsequently weighted with a weight of 20%.

In order to pass the subject, two conditions must be met: grade of the theoretical-practical part higher or equal to 5.0/10. In such a case, the final grade will be the weighted sum of both grades.

If one of the two preconditions is not fulfilled, the final grade will be the one corresponding to the one not fulfilled. If neither of the two conditions is fulfilled, the final grade will be that of the theoretical-practical part.

First call for global test.

Two written exams analogous in structure and subject matter to each of the written exams of the continuous assessment. Those who have not passed the practices may repeat them. For each of the two blocks of the syllabus, the highest gradewill be taken from among the written exams taken in the continuous assessment and in the global assessment.

Then, the same averaging and weighting criteria will be applied to find the final grade as those explained for continuous assessment.

Second call.

A single written test composed of problems and theoretical-practical questions in which the entire syllabus will be evaluated. Those who have not passed the practices may repeat them.

The criteria for the final grade of the subject will be the same as in the first call, except that, instead of taking the average of two exams, there will be a single exam to evaluate the theoretical-practical part.

Summary table.

Assessment instruments:	Weighting	RA-1	RA-2	RA-3	RA-4	RA-5	RA-6
First continuous theoretical-practical exam.	40%	x	x	x			
Second continuous theoretical-practical exam.	40%			x	x	x	
First Theoretical-Practical Examination first call	40%	x	x	x			
Second Theoretical-Practical Examination First Call	40%			x	x	x	
Theoretical-practical exam second call	80%	x	x	x	x	x	
Computer simulations	20%						x

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Continuous assessment system:

Concept	Percentage	Assessment Criteria
A: Written Tests.		
There will be three compulsory written tests	50%	Minimum grade for each test≥ 3.0

1st SP on topics 1 and 2

2nd SP on item 3

3rd SP on topics 4 and 5

		Minimum grade for Block (A) ≥ 4.0

B: Continuous Assessment Exercises.

A total of 5 exercises will be carried out for the continuous assessment (one for each topic) on a mandatory basis	30%	Minimum grade for each exercise≥ 3.0
		Minimum grade for Block (B) ≥ 4.0

C: Simulation Practices.

Three practice sessions will be conducted on a mandatory basis.	20%	Minimum grade for each practical ≥ 3.0
		Minimum Block Grade (C) ≥ 4.0

1st Practice on topic 2

2nd Practice on topic 3

3rd Practice on topic 4

Average grade of the subject = 50%A+30%B+20%C ≥ 5.0

A minimum grade of 5.0 must be obtained in order to pass the subject and all prerequisites mentioned above must be fulfilled. Students who have passed the subject through this dynamic, may opt in the ordinary callto raise the grade (presenting to the full subject)

In caseof not passing with the previous system, there will betwo additional calls (Ordinary and Extraordinary) with a Global Assessment Test, which reflects the achievement of the learning results. This test will be a single test with theory and exercises representative of the entire syllabus of the subjectcontributing 100% to the final grade of the subject.

6. Sustainable Development Goals

4 - Quality Education
5 - Gender Equality
9 - Industry, Innovation and Infrastructure