



IDENTIFYING DATA

Machine design and testing

Subject	Machine design and testing			
Code	V12G363V01602			
Study programme	Grado en Ingeniería en Tecnologías Industriales			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	3rd	2nd
Teaching language	Spanish Galician English			
Department				
Coordinator	González Baldonado, Jacobo			
Lecturers	González Baldonado, Jacobo Segade Robleda, Abraham			
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General description	<p>This subject is intended to allow the students to apply the fundamentals of Mechanism and Machines Theory to the design of machines as well as the necessary knowledge, comprehension, and application of these concepts concerning to the field of Mechanical engineering.</p> <p>It also provides the students with the most important concepts related to the design of machines. The students will know and apply analysis methods for the design of machines by applying analytical methods or/and through the effective use of simulation software.</p>			

Training and Learning Results

Code	
B3	CG3 Knowledge of basic and technological subjects that enable students to learn new methods and theories, and to adapt to new situations.
B4	CG4 Ability to solve problems through initiative, decision-making, creativity, critical reasoning, and to communicate and transmit knowledge, skills and abilities in the field of industrial engineering.
B5	CG5 Knowledge to carry out measurements, calculations, assessments, appraisals, surveys, studies, reports, work plans and other similar works.
B6	CG6 Capacity for handling specifications, regulations and mandatory standards.
B11	CG11 Knowledge, understanding and ability to apply the legislation relating to industrial installations.
C13	CE13 Knowledge of the principles of the theory of machines and mechanisms.
C26	CE26 Knowledge and abilities to calculate, design and test machines.
D2	CT2 Problem solving.
D9	CT9 Application of knowledge.
D16	CT16 Critical thinking.
D20	CT20 Ability to communicate with people not expert in the field.

Expected results from this subject

Expected results from this subject	Training and Learning Results		
Knowledge of calculation methods applied in Mechanical design.	B3	C13	D2
	B4	C26	D9
	B5		D16
Knowledge and design capabilities applied in mechanical power transmissions.	B6	C13	D2
		C26	D9
			D16
			D20

Knowledge of the fundamental laws applied in the study of machine elements.	B11	C13 C26	D2 D9 D16 D20
Calculation capabilities and analysis applied for different machine components.	B3 B11	C13 C26	D2 D9 D16

Contents

Topic	
Mechanical design	1. Design vs. static loads 2. Design vs. dynamic loads
Power Transmissions	3. Introduction to power transmission systems 4. Gears (spur, bevel, and worm gears) 5. Axles and shafts
Machine elements	6. Clutches and brakes 7. Bolted joints and power screws 8. Plain and ball bearings

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	23	19.5	42.5
Problem solving	9	30	39
Laboratory practical	18	45	63
Problem and/or exercise solving	2.5	0	2.5
Problem and/or exercise solving	0	3	3

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Lectures about the topics of the subject
Problem solving	Discussion of exercises
Laboratory practical	Practical sessions including specific material and software tools.

Personalized assistance

Methodologies	Description
Lecturing	Group or individual tutorial sessions will be held during office hours to strengthen the acquired knowledge and to guide and assess the proposed works/papers
Problem solving	Group or individual tutorials will be held during office hours to strengthen the acquired knowledge and to guide and assess the proposed works/papers.
Laboratory practical	Group or individual tutorials will be held during office hours to strengthen the acquired knowledge and to guide and assess the proposed works/papers.

Assessment

	Description	Qualification	Training and Learning Results	
Laboratory practical	The attendance and participation of students in laboratory practices will be valued. To complete the practice activities, a online questionnaire will need to be solved, covering aspects derived from the material taught in the practice.	30	C13 C26	D2 D9 D16 D20
Problem and/or exercise solving	Several problem-solving tests will be formulated in Moovi, which will be solved virtually. The scheduling of these tests will be done with sufficient advance notice and in accordance with the current regulations.	30	B3 B4 B5 B6 B11	C13 C26 D2 D9 D16
Problem and/or exercise solving	Students will be evaluated in a final written exam on the date established in the exam calendar. This test will assess all the content developed in the subject.	40	B3 B4 B5 B6 B11	C13 C26 D2 D9 D16 D20

Other comments on the Evaluation

Continuous Assessment

1st Edition

The subject will be approved if a final grade of 5 or higher is obtained as follows:

- Attendance and successful completion of laboratory/computer room/equivalent classroom will have a maximum rating of 3 points towards the final grade. To add the practice grade, a minimum attendance of 7 sessions is required, and a minimum rating of 1 point out of 3 for the practice activities.
- The problem-solving tests in Moovi will have a maximum rating of 3 points towards the final grade. To have this section count, a minimum of 1 point out of 3 is required.
- The final exam will have a maximum rating of 4 points towards the final grade. A minimum of 1.5 out of 4 is established for this part of the evaluation system. If the minimum is not obtained in the final exam, the final grade will be the rating of this test weighted out of 10.

2nd Edition

In the second edition, the problem-solving tests can be retaken, so the final test will have a maximum rating of 7 points with a minimum score of 2.5 (out of 7). The grade for those who do not reach the minimum in this part will be the rating of the problem-solving test weighted out of 10 points.

Overall Evaluation

For those who opt for the global evaluation system following the mechanisms established by the School of Industrial Engineering, the evaluation system will consist of the following sections:

- Evaluation of the practical part: This test consists of solving a series of questions related to the content taught in the practical sessions of the subject. It will have a maximum rating of 3, and a minimum of 1 point must be obtained for it to count.
- Problem-solving and/or exercises test: The final exam will have a maximum rating of 7 points towards the final grade. A minimum of 2.5 out of 7 is established for this part of the evaluation system. If the minimum is not obtained in the final exam, the final grade will be the rating of this test weighted out of 10.

Ethical Commitment

It is expected that the student presents appropriate ethical behavior. In the event of detecting unethical behavior (copying, plagiarism, use of unauthorized electronic devices, among others), it will be considered that the student does not meet the necessary requirements to pass the subject. In this case, the overall grade for the current academic year will be a fail (0.0).

The use of any electronic devices during assessment tests will not be allowed unless expressly authorized. The introduction of an unauthorized electronic device in the exam room will be considered grounds for not passing the subject in the current academic year, and the overall grade will be a fail (0.0).

*A numerical grading system from 0 to 10 points will be used according to the current legislation (RD 1125/2003 of September 5, BOE of September 18).

Sources of information

Basic Bibliography

Norton, R., **Machine Design. An Integrated Approach**, Pearson, 2012

Shigley, J.E, **Mechanical Engineering Design**, 9ª edición, Mc Graw Hill, 2012

Norton, R., **Diseño de Máquinas. Un Enfoque Integrado**, Pearson, 2012

Shigley, J.E, **Diseño de en Ingeniería Mecánica**, 9ª edición, Mc Graw Hill, 2012

Complementary Bibliography

Mott, Robert L., **Machine Elements in Mechanical Design**, Pearson, 2006

Lombard, M, **Solidworks 2013 Bible**, Wiley, 2013

Hamrock, Bernard J, et al., **Fundamental Machine Elements**, Mc Graw Hill, 2000

Mott, Robert L., **Diseño de elementos de máquinas**, Pearson, 2006

Hamrock, Bernard J, et al., **Elementos de Máquinas**, Mc Graw Hill, 2000

Recommendations

Subjects that it is recommended to have taken before

Materials science and technology/V12G360V01301

Mechanics of materials/V12G360V01404

Mechanism and machine theory/V12G360V01303
