IDENTIFYING DATA
Mechanism and machine theory

Subject	Mechanism and machine theory
Code	V12G363V01303
Study programme	Grado en Ingeniería en Tecnologías Industriales

Descriptors	ECTS Credits		Choose	Year	Quadmester
	6		Mandatory	2nd	1st

Teaching language	English
Department	
Coordinator	Fernández Vilán, Ángel Manuel Segade Robleda, Abraham
Lecturers	Segade Robleda, Abraham
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Web	http://moovi.uvigo.gal/
General description	This subject is intended to provide the students with basic knowledge about Mechanism and Machine Theory as well as his applications in the field of Mechanical engineering. It also covers and provides the students with the most important concepts related with Mechanism and Machine Theory. The students will know and apply kinematic and dynamic analysis methods for mechanical systems both with graphical and analytical methods and also through effective use of simulation software. Furthermore, this subject serves as an introduction of some aspects about machinery design; a topic that will be cover thoroughly in future subjects of the Degree.

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.
C13	CE13 Knowledge of the principles of the theory of machines and mechanisms.
D2	CT2 Problem solving.
D6	CT6 Application of computer science in the field of study.
D9	CT9 Application of knowledge.
D10	CT10 Self learning and work.
D16	CT16 Critical thinking.

Expected results from this subject

Expected results from this subject	Training and Learning Results		
To know the fundamentals of Mechanism and Machines Theory, and the application of these concepts concerning to the field of Mechanical engineering to solve problems related with this subject in the Industrial Engineering field.	B3 B4	C13	D2 D6 D9 D10 D16
To know, comprehend, apply, and practice the concepts related to Mechanism and Machines Theory.	B3 B4	C13	D2 D6 D9 D10 D16

To know and apply kinematic and dynamic analyses techniques to mechanical systems.	B3 B4	C13	D2 D6 D9 D10 D16
Efficiently know and utilize software for analysis of mechanisms.	B3 B4	C13	D2 D6 D9 D10 D16

Contents

Topic	
Introduction to mechanism and machine theory	Introduction Definition of Machine, Mechanism and Kinematic Chain Link/part and linkage/joint Classification Kinematic Diagram, modeling, and symbology (nomenclature) Mobility Degrees of freedom Synthesis of mechanisms
Geometrical analysis of mechanisms.	Introduction Calculation methods of placement Loop closure equations
Kinematic analysis of mechanisms	Fundamentals Graphical methods Analytical methods Matrix methods
Static analysis of mechanisms	Fundamentals Force reduction (Graphical Methods) Work/Power Virtual Methods
Dynamic analysis of mechanisms	Fundamentals Machine general dynamics Machine Work and Power Balanced Dynamics of rotors
Cam mechanisms	Fundamentals Flat cams Cam synthesis
Power transmission mechanisms	Fundamentals Gears Mechanism Other mechanisms

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	23	19.5	42.5
Problem solving	12.5	30	42.5
Laboratory practical	18	47	65

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

Methodologies

	Description
	Description
Lecturing	Clase magistral en la que exponen los contenidos teóricos.
Problem solving	Resolución de problemas utilizando los conceptos teóricos presentados en aula.
Laboratory practical	Realización de tareas prácticas en laboratorio docente o aula informática

Personalized assistance

Methodologies	Description
Lecturing	Group or individual tutorials 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
Problem solving	Problem-solving tests will be conducted during the approved school schedule. None of the tests may exceed the legally established maximum percentage. Minimum grades may be set for any of the tests to access the overall weighting. The content, dates, weights, and other specific details of each test will be published through the online teaching platform with an appropriate minimum advance notice, never less than two weeks before.	80	B3 C13 D2 B4 — D6 — — D9 — — D10 — — D16
Laboratory practical	Attendance with achievement in the Laboratory/Computer Room, the grading of reports submitted for each practical session, and supervised projects will have a maximum value of 2 points for the final grade. In order to be evaluated in this section, the student must attend a minimum of 7 practical sessions.	20	B3 C13 D2 B4 — D6 — — D9 — — D10 — — D16

Other comments on the Evaluation

The subject will be passed if a final grade equal to or greater than 5 is obtained, following the following criteria:

- Final Exam: Problem-solving related to the subject. Problem-solving Tests: Problem-solving tests will be conducted during the approved school schedule, including the exam period. None of the tests may exceed the legally established maximum percentage. Minimum grades may be set for any of the tests to contribute to the overall weighting. The content, dates, weights, and other specific details of each test will be published through the online teaching platform with an appropriate minimum advance notice, never less than two weeks before.

- Laboratory Sessions: Attendance with achievement in the Laboratory/Computer Room, the grading of reports submitted for each practical session, and supervised projects will have a maximum value of 2 points for the final grade. In order to be evaluated in this section, the student must attend a minimum of 7 practical sessions.

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

Overall Evaluation: For students who explicitly waive continuous assessment, a single exam will be conducted to evaluate all the content of the subject, scored out of 10 points.

Ethical Commitment: Students are expected to exhibit appropriate ethical behavior. In the case of detecting unethical behavior (cheating, plagiarism, use of unauthorized electronic devices, and 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).

No devices are allowed during the evaluation tests unless expressly authorized. Introducing unauthorized devices into the examination room will be considered grounds for not passing the subject in the current academic year, resulting in an overall grade of fail

(0.0).

Sources of information

Basic Bibliography

Munir Khamashta, **Problemas resueltos de cinemática de mecanismos planos**, UPC,

Munir Khamashta, **Problemas resueltos de dinámica de mecanismos planos**, UPC,

Calero Pérez, R. y Carta González, J.A., **Fundamentos de mecanismos y máquinas para ingenieros**, McGraw-Hill,

Complementary Bibliography

García Prada, J.C. Castejón, C., Rubio, H., **Problemas resueltos de Teoría de Máquinas y mecanismos**, THOMSON,

Cardona, S. y Clos D., **Teoría de Máquinas.**, UPC,

Shigley, J.E.; Uicker J.J. Jr., **Theory of Machines and Mechanisms**, McGraw-Hill,

Hernández A, **Cinemática de mecanismos: Análisis y diseño**, SÍNTESIS,

Lamadrid Martínez, A.; Corral Sáiz, A., **Cinemática y Dinámica de Máquinas**, E.T.S.I.I.T,

Mabie, Reinholtz, **Mechanisms and dynamics of machinery**, Limusa-wyley,

Nieto, j., **Síntesis de Mecanismos**, AC,

Erdman, A.G.; Sandor, G.N.,, **Mechanism Design: Analysis and Synthesis**, PRENTICE HALL,

Simon A.; Bataller A; Guerra .J.; Ortiz, A.; Cabrera, J.A., **Fundamentos de teoría de Máquinas**, BELLISCO,

Kozhevnikov SN, **Mecanismos**, Gustavo Gili,

Recommendations

Subjects that continue the syllabus

Machine design I/V12G380V01304
Automobiles and railways/V12G380V01941
Design of hydraulic machines and oleo-pneumatic systems/V12G380V01914
Machine design II/V12G380V01911
Computer-aided mechanical design/V12G380V01915
Transport engineering/V12G380V01945
Thermal engines and machines/V12G380V01913
Systems for data analysis, simulation and validation/V12G380V01933
Hybrid and electric automotive vehicles/V12G380V01944

Subjects that it is recommended to have taken before

Graphic expression: Graphic expression/V12G380V01101
Physics: Physics I/V12G380V01102
Mathematics: Algebra and statistics/V12G380V01103
Mathematics: Calculus I/V12G380V01104
Mathematics: Calculus II and differential equations/V12G380V01204

Other comments

Requirements: to enrol in this subject, it is mandatory to have passed or at least, to be enrolled of all first year subjects.
In case of discrepancies, the Spanish version of this guide prevails.