IDENTIFYING DATA

Mechanism and machine theory

Subject	Mechanism and machine theory
Code	V12G380V01306
Study programme	Grado en Ingeniería Mecánica

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

Teaching language	Spanish Galician English
Department	
Coordinator	Fernández Vilán, Ángel Manuel González Baldonedo, Jacobo
Lecturers	Collazo Rodríguez, Benjamín Alejandro Fernández Vilán, Ángel Manuel González Baldonedo, Jacobo
E-mail	jacobo.gonzalez.baldonedo@uvigo.es avilan@uvigo.es
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 in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
B4	CG4 Ability to solve problems with initiative, decision making, creativity, critical thinking and the ability to communicate and transmit knowledge and skills in the field of industrial engineering in Mechanical specialty.
C13	CE13 Knowledge of the principles of the theory of machines and mechanisms.
D2	CT2 Problems resolution.
D6	CT6 Application of computer science in the field of study.
D9	CT9 Apply 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	Master class where the theoretical concepts are explain
Problem solving	Problem solving using the theoretical concepts presented in the Master Lesson
Laboratory practical	Practical tasks developed at the teaching laboratory or computer lab.

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 carried out during school hours approved by the School. None of the tests shall exceed the maximum percentage percentage legally established. Minimum ratings may be established on any of the tests to access the overall weighting. The contents, dates, weightings and other details specific to each test will be published through the teleteaching platform with adequate minimum advance, never less than two weeks before its completion. Learning outcomes: All are evaluated.	80	B3 C13 D2 B4 D6 D9 D10 D16
Laboratory practical	The attendance with use to the Laboratory/Computer Classroom, the qualification of the memories delivered in each practice and the supervised works, will have a maximum assessment of 2 points of the final note. To be evaluated in this section the student must attend a minimum number of practices. Learning results: All are evaluated.	20	B3 C13 D2 B4 D6 D9 D10 D16

Other comments on the Evaluation

The subject will be passed if a grade equal to or greater than 5 is obtained as a final grade, as follows:

* Problem solving tests. Problem-solving tests will be carried out during school hours approved by the School. None of the tests shall exceed the maximum percentage percentage legally established. Minimum ratings may be established on any of the tests to access the overall weighting. The contents, dates, weightings and other details specific to each test will be published through the teleteaching platform with adequate minimum advance, never less than two weeks before its completion.

* Laboratory practices.The attendance with use to the Laboratory/Computer Classroom, the qualification of the memories delivered in each practice and the supervised works, will have a maximum assessment of 2 points of the final note. To be evaluated in this section the student must attend a minimum number of practices.

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

Overall assessment. For students who expressly renounce the continuous evaluation, a single examination will be made in which all the contents of the subject can be evaluated, scored over 10 points.

Ethical commitment: The student is expected to present an appropriate ethical behavior. In the case of detecting unethical behavior (copying, plagiarism, use of unauthorized electronic devices, and others) the student will be considered not to meet the requirements necessary to pass the subject. In this case the overall qualification in this academic year will be suspended (0.0). No device shall be permitted to be used during the evaluation tests unless expressly authorised. The introduction of unauthorised devices in the examination room will be considered as reason for not passing the subject in the current academic year and the overall qualification will be suspended (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.