

[GMQ202] THEORY OF MECHANISMS

GENERAL INFORMATION

Studies	DEGREE IN MECHANICAL ENGINEERING		Subject	?
Semester	1	Course	3	Mention / Field of specialisation
Character	COMPULSORY		Language	ENGLISH
Plan	2017	Modality	Face-to-face	Total hours
Credits	6	Hours/week	4.56	82 class hours + 68 non-class hours = 150 total hours

PROFESSORS

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REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
PHYSICS II MECHANICS	(No previous knowledge required)

SKILLS

VERIFICA SKILLS

SPECIFIC

GMCI07 - To know the principles of mechanisms and machine theory.

GENERAL

GMCT01 - To be able to design, draft, sign and develop mechanical engineering projects for the construction, renovation, repair, maintenance, demolition, manufacture, installation, assembly and operation of structures, mechanical equipment, energy facilities, electric and electronic installations, industrial plants and facilities and manufacturing and automation processes.

GMCT03 - To build on basic concepts and technologies to expand knowledge of new theories and methods, and to acquire flexibility to adapt to new situations

GMCT05 - Possessing the knowledge for performing measurements, calculations, valuations, estimates, inspections, studies, reports, work plans and other similar tasks.

BASIC

G_CB1 - To have proven to understand and have knowledge in a field of study based on general secondary education at a level found in advanced textbooks and including concepts at the forefront of their field of study.

G_CB2 - To be able to apply knowledge to occupational or professional tasks; have the necessary skills to pose and defend arguments, and to solve problems within their field of study

G_CB3 - To be capable of gathering and interpreting relevant data (normally within their field of study) in order to make judgements, reflecting on relevant matters of a social, scientific or ethical nature

G_CB5 - To have developed learning abilities required to embark on subsequent studies with a high level of autonomy.

ENAAE LEARNING RESULTS

	ECTS
ENA102 - Knowledge and comprehension: Knowledge and comprehension of the engineering disciplines of their speciality, at the level necessary to acquire the rest of the competencies of the degree, including notions of the latest advances.	5,32
ENA103 - Knowledge and comprehension: Awareness of the multidisciplinary context of engineering.	0,04
ENA104 - Analysis in engineering: The ability to analyse complex products, processes and systems in their field of study; choose and apply relevant analytical, calculation and experimental methods in a suitable way; and correctly interpret the results of such analyses.	0,04
ENA105 - Analysis in engineering: The ability to identify, formulate and solve engineering problems in their speciality; choose and apply adequately established analytical, calculation and experimental methods; and acknowledge the importance of social, health and safety, environmental, economic, and industrial restrictions.	0,04
ENA106 - Engineering projects: Ability to project, design and develop complex products (parts, components, finished products, etc.), processes and systems of their speciality, which meet the established requirements, including awareness of the social, health and safety, environmental, economic and industrial aspects, as well as selecting and applying appropriate project methods.	0,04
ENA107 - Engineering projects: Project capacity some state-of-the-art knowledge of their engineering speciality.	0,04
ENA108 - Research and innovation: Ability to carry out bibliographic searches and consult and use databases and other information sources with discretion, in order to carry out simulation and analysis with the aim of conducting research on technical topics of their speciality.	0,04
ENA109 - Research and innovation: Ability to consult and apply codes of good practice and security in their speciality.	0,04
ENA110 - Research and innovation: Capacity and ability to project and carry out experimental investigations, interpret results, and reach conclusions in their field of study.	0,04
ENA111 - Practical application of engineering: Understanding of the applicable techniques and methods for analysis, design and research and their limitations in the field of their speciality.	0,04
ENA112 - Practical application of engineering: Practical competency to solve complex problems, carry out complex engineering projects, and conduct investigations specific to their speciality.	0,04
ENA113 - Practical application of engineering: Knowledge of application of materials, equipment and tools, engineering	0,04

technology and processes, and their limitations in the field of their speciality.

ENA115 - Practical application of engineering: Knowledge of the social, health and safety, environmental, economic and industrial implications of engineering practice.	0,04
ENA118 - Preparation of judgements: Ability to manage complex technical or professional activities or projects of their speciality, taking responsibility for decision making.	0,04
ENA119 - Communication and Teamwork: Ability to effectively communicate information, ideas, problems and solutions in the field of engineering and with society in general.	0,04
ENA120 - Communication and Teamwork: Ability to operate effectively in domestic and international contexts, individually and as a team, and to cooperate with both engineers and people from other disciplines.	0,04
ENA121 - Continued training: Ability to acknowledge the need for their own continued training and to undertake this activity throughout their professional life independently.	0,04
ENA122 - Continued training: Ability to stay up to date on science and technology innovations.	0,04

Total: 6

LEARNING RESULTS

RG304 Define the problem, develop the solution and present the conclusions in a efficient manner, arguing and justifying each one of them in writing.

LEARNING ACTIVITIES

	CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc. Relating to projects/POPBLs carried out individually or in teams	3 h.	3 h.	6 h.

EVALUATION SYSTEM

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	100%
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MAKE-UP MECHANISMS

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

CH - Class hours: 3 h.
NCH - Non-class hours: 3 h.
TH - Total hours: 6 h.

RG305 Define the problem, develop the solution and present the conclusions in a efficient manner, arguing and justifying each one of them in spoken form.

LEARNING ACTIVITIES

	CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc. Relating to projects/POPBLs carried out individually or in teams	3 h.	3 h.	6 h.

EVALUATION SYSTEM

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	100%
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MAKE-UP MECHANISMS

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

CH - Class hours: 3 h.
NCH - Non-class hours: 3 h.
TH - Total hours: 6 h.

RG302 Analyze the intervening variables in the problem and propose actions for a stable situation.

LEARNING ACTIVITIES

	CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc. Relating to projects/POPBLs carried out individually or in teams	3 h.	3 h.	6 h.

EVALUATION SYSTEM

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	100%
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MAKE-UP MECHANISMS

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

CH - Class hours: 3 h.
NCH - Non-class hours: 3 h.

TH - Total hours: 6 h.

RG301 Assumes responsibilities in the work team, organizing and planning the tasks to be developed, facing the contingencies and encouraging the participation of its members.

LEARNING ACTIVITIES	CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc. Relating to projects/POPBLs carried out individually or in teams	2 h.	3 h.	5 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	100%	Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

CH - Class hours: 2 h.
NCH - Non-class hours: 3 h.
TH - Total hours: 5 h.

RGM310 Perform the kinetic and kinematic analysis of mechanisms using classical and analytical mechanics

LEARNING ACTIVITIES	CH	NCH	TH
Individual study and work, tests and evaluations and check points	2 h.	16 h.	18 h.
Presentation of the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	20 h.		20 h.
Individual and team exercises	3 h.	2 h.	5 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Individual written and oral tests to assess technical skills of the subject	70%	Individual written and oral tests to assess technical skills of the subject
Reports of solving exercises, case studies, computer practices, simulation practices and laboratory practices	30%	

CH - Class hours: 25 h.
NCH - Non-class hours: 18 h.
TH - Total hours: 43 h.

RGM312 Apply the fundamental laws of classical and analytical mechanics in a real situation

LEARNING ACTIVITIES	CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc. Relating to projects/POPBLs carried out individually or in teams	17 h.	20 h.	37 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	100%	Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

Comments: Continuous assessment and project feedback

CH - Class hours: 17 h.
NCH - Non-class hours: 20 h.
TH - Total hours: 37 h.

RGM311 Analyse the vibrations of a mechanical system using Lagrange's equations

LEARNING ACTIVITIES	CH	NCH	TH
Individual study and work, tests and evaluations and check points	2 h.	14 h.	16 h.
Presentation of the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	22 h.		22 h.

Individual and team exercises	2 h.	2 h.	4 h.
Individual or team workshop and/or lab practice	3 h.	2 h.	5 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANISMS	
Individual written and oral tests to assess technical skills of the subject	70%	Individual written and oral tests to assess technical skills of the subject	
Reports of solving exercises, case studies, computer practices, simulation practices and laboratory practices	30%		
CH - Class hours: 29 h.			
NCH - Non-class hours: 18 h.			
TH - Total hours: 47 h.			

CONTENTS

1. Kinematics and kinetics of mechanisms.
2. Analytical mechanics:
 - Principle of virtual work.
 - Lagrange's equation.
3. Mechanical vibrations.

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Subject notes	Meriam J.L. Dinámica, Ed. Reverté, 3ª Ed, 1997
Specific Master Software	Beer F.P. y Johnston E.R., Mecánica Vectorial para Ingenieros. Dinámica, McGraw-Hill, 6ª Ed. 1998
Moodle Platform	Shigley J.E. y Uicker J.J Jr., Teoría de máquinas y mecanismos, McGraw-Hill, 1983
Multifunction Room	Agulló, J., Mecánica de la partícula y del sólido rígido, Publ. OK Punt, 1996
Slides of the subject	Burton, P., Kinematics and Dynamics of Planar Machinery, Prentice Hall, 1979
	Sandor, G.N., Mechanism Design Analysis and Synthesis, Vol. I y II, Prentice-Hall, 3ª Ed., 1997