

[GJJ106] MECHANICAL SYSTEMS DESIGN AND TESTING

GENERAL INFORMATION

Studies	DEGREE IN MECHATRONICS ENGINEERING		Subject ?
Semester	1	Course	4
Character	COMPULSORY		Mention / Field of specialisation
Plan	2020	Modality	Adapted Face-to-face
Credits	4,5	Hours/week	3.75
		Language	ENGLISH
		Total hours	67.5 class hours + 45 non-class hours = 112.5 total hours

PROFESSORS

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REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
GRAPHIC EXPRESION PHYSICS ELECTROMECHANICAL SYSTEMS MATERIAL STRENGTH AND ELASTICITY	(No previous knowledge required)

SKILLS

VERIFICA SKILLS

SPECIFIC

GJCE17 - Knowledge and skills for the testing of machines and mechanical systems

GENERAL

GJCG01 - To be able to take the initiative in problem solving, decision making, creativity, critical thinking, effective communication and the transfer of knowledge and skills in the field of mechatronics engineering

GJCG03 - Addressing and optimising activities of assembly, commissioning, assistance and maintenance of facilities, machinery, and industrial mechatronic systems

GJCG05 - Developing and designing products, equipment and mechatronic systems while complying with the technical, economic, quality and safety requirements established in the specifications and required by current legislation

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_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

LEARNING RESULTS

RGJ405 They know and use techniques and tools for the testing and health monitoring of mechanical components and machines

LEARNING ACTIVITIES

	CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc.	3 h.	3 h.	6 h.
Relating to projects/POPBLs carried out individually or in teams			
Individual study and work, tests and evaluations and check points	5 h.	7 h.	12 h.
Presentation of the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	11 h.	6 h.	17 h.

EVALUATION SYSTEM

	W
Individual written and oral tests to assess technical skills of the subject	45%
Reports of solving exercises, case studies, computer practices, simulation practices and laboratory practices	35%
Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	20%

MAKE-UP MECHANISMS

Individual written and oral tests to assess technical skills of the subject

CH - Class hours: 19 h.
NCH - Non-class hours: 16 h.
TH - Total hours: 35 h.

RGJ406 They know and use techniques and tools for the testing and health monitoring of mechanical components and machines

LEARNING ACTIVITIES		CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc.		8,5 h.	6 h.	14,5 h.
Relating to projects/POPBLs carried out individually or in teams				
Individual study and work, tests and evaluations and check points		12 h.	6 h.	18 h.
Classroom presentations of relevant concepts and procedures in participatory environments		20 h.	13 h.	33 h.
EVALUATION SYSTEM		W	MAKE-UP MECHANISMS	
Individual written and oral tests to assess technical skills of the subject		30%	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		50%		
Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence		20%		

CH - Class hours: 40,5 h.
NCH - Non-class hours: 25 h.
TH - Total hours: 65,5 h.

RGJ414 They assume responsibilities in the team, organizing and planning the tasks to be developed, dealing with contingencies and encouraging the participation of its members.

LEARNING ACTIVITIES		CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc.		2 h.	1 h.	3 h.
Relating to projects/POPBLs carried out individually or in teams				
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. Retake is not foreseen.	

CH - Class hours: 2 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 3 h.

RGJ415 They analyze the variables involved 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.		2 h.	1 h.	3 h.
Relating to projects/POPBLs carried out individually or in teams				
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. Retake is not foreseen.	

CH - Class hours: 2 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 3 h.

RGJ416 They define the problem, the development of the solution, as well as the conclusions in an effective way, arguing and justifying each of them, making a correct use of the language, in writing.

LEARNING ACTIVITIES

	<i>CH</i>	<i>NCH</i>	<i>TH</i>
Development, writing and presentation of memorandums, reports, audiovisual material, etc.	2 h.	1 h.	3 h.
Relating to projects/POPBLs carried out individually or in teams			

EVALUATION SYSTEM

	<i>W</i>
Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	100%

MAKE-UP MECHANISMS

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

Comments: Continuous assessment. Retake is not foreseen.

CH - Class hours: 2 h.

NCH - Non-class hours: 1 h.

TH - Total hours: 3 h.

RGJ417 They define the problem, the development of the solution, as well as the conclusions in an effective way, arguing and justifying each one of them, and making a correct use of the language, orally.

LEARNING ACTIVITIES

	<i>CH</i>	<i>NCH</i>	<i>TH</i>
Development, writing and presentation of memorandums, reports, audiovisual material, etc.	2 h.	1 h.	3 h.
Relating to projects/POPBLs carried out individually or in teams			

EVALUATION SYSTEM

	<i>W</i>
Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	100%

MAKE-UP MECHANISMS

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

Comments: Continuous assessment. Retake is not foreseen.

CH - Class hours: 2 h.

NCH - Non-class hours: 1 h.

TH - Total hours: 3 h.

CONTENTS

1. MECHANICAL TESTING

1.1. Instrumentation, sensors and estensometry

1.2. Time vs frequency analysis (machine monitoring)

2. MECHANICAL DESIGN

2.1. Bearings

Bearing sizing

Design of bearing-based assemblies

2.2. Couplings

2.3. Fasteners joints

2.4. Shafts

Shaft design

Shaft alignment

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Class presentations
Programmes
Subject notes
Topic related web quires

Bibliography

J. Hamrock, O. Jacobson, R. Schmid. Fundamentals of machine elements. Third edition. Editorial Taylor & Francis Group, LLC. 2014
Peter R.N. Childs. Mechanical Design Engineering Handbook. Elsevier Ltd. 2014
John Piotrowski. Shaft Alignment Handbook. CRC Press. 2006.
Hung Nguyen-Schäfer. Computational Design of Rolling Bearings. Springer (2016)
http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_Ink.pl?grupo=MECATRONICA41&ejecuta=15&_ST