[GJK206] INSTRUMENTATION AND CONTROL

GENERAL INFORMATION

Studies	DEGREE IN MECHATRONICS ENGINEERING			**Subject**	?
Semester	2	**Course**	3	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2022	**Modality**	Face-to-face	**Language**	CASTELLANO/EUSKARA
Credits	4,5	**Hours/week**	3.75	**Total hours**	67.5 class hours + 45 non-class hours = **112.5 total hours**

PROFESSORS

ARANGUREN DERIOZPIDE, JON
LOPEZ RAMIREZ, IZAR

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
MODELLING AND SIMULATION OF DYNAMIC SYSTEMS	*(No previous knowledge required)*

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GJR307 - To know and apply the basic principles of fluid mechanics and thermodynamics applied to the resolution of engineering problems			*x*	4,02
G-RTR1 - To develop interdisciplinary projects specific to their specialty and of gradual complexity, - becoming aware of respect for human rights and fundamental rights, and analyzing and assessing the impact of the proposed solutions on the SDGs - to acquire and/or apply basic, advanced and /or avant-garde, demonstrating the ability to work in multidisciplinary teams and/or undertake further studies with a high degree of autonomy		*x*		0,24
G-RTR2 - To express information, ideas and the arguments that support them in an orderly, clear and coherent manner, orally and in writing, based on quality information, self-made or obtained from different sources, using inclusive and non-discriminatory language		*x*		0,24
			Total:	4,5

KC: Knowledge or Content / SK: Skills / AB: Abilities

SECONDARY LEARNING RESULTS

RGJ390 **[!]** ***Definir y gestionar los objetivos y la planificación de un proyecto que le permita adquirir y/o reforzar los conocimientos de tecnologías específicas de su especialidad,- que en ocasiones llegan a la vanguardia del conocimiento- y definir una estrate***

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	2 h.	1 h.	3 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

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

RGJ391 **[!]** ***Coordinar el equipo de trabajo, estimulando la cohesión y buen clima para lograr la integración de todas las personas y su contribución para alcanzar un rendimiento apropiado, tanto a nivel individual como grupal, para el desarrollo del proyecto en***

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	2 h.	1 h.	3 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies,	100%

MAKE-UP MECHANISMS

(No mechanisms)

computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	**Comments:** Continuous assessment. Retake is not foreseen.

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

RGJ393 **[!]** ***Elabora la memoria del proyecto, aportando argumentos elaborados y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.***

LEARNING ACTIVITIES	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	1 h.	2 h.	3 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	*(No mechanisms)* **Comments:** Revision and correction of the written report of the semester project.

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

RGJ394 **[!]** ***Realiza una presentación oral del proyecto, justificando las soluciones propuestas con argumentos elaborados y precisos, y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.***

LEARNING ACTIVITIES	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	2 h.	1 h.	3 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%	*(No mechanisms)* **Comments:** Continuous assessment. Retake is not foreseen.

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

RGJ322 **[!]** ***Diseña e implementa sistemas de medición en aplicaciones industriales***

LEARNING ACTIVITIES	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	6 h.	4 h.	10 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	13 h.	7 h.	20 h.
Carrying out exercises and solving problems individually and/or in teams	5,5 h.	6 h.	11,5 h.

EVALUATION SYSTEM	W	MAKE-UP MECHANISMS
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	50%	Individual written and/or oral tests or individual coding/programming tests **Comments:** Final grade= Initial grade*0,25+Make Up grade*0,75

Individual written and/or oral tests or individual coding/programming tests	50%

CH - Class hours: 24,5 h.
NCH - Non-class hours: 17 h.
TH - Total hours: 41,5 h.

RGJ3323 **[!]** ***Implementa sistemas básicos de control en lazo cerrado***

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	4 h.		4 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	22 h.	8 h.	30 h.
Carrying out exercises and solving problems individually and/or in teams	10 h.	15 h.	25 h.

EVALUATION SYSTEM	W
Individual written and/or oral tests or individual coding/programming tests	100%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Final grade= Initial grade*0,25+ Make Up grade*0,75

CH - Class hours: 36 h.
NCH - Non-class hours: 23 h.
TH - Total hours: 59 h.

CONTENTS

1.- Frequency response analysis

- Frequency response

- Bode diagrams

– Vibrations

2.- Introduction to control systems

- Feedback control systems

- Feedback controllers

- Steady state accuracy

- Closed-loop stability

- Root-locus method

3.- Sensor fundamentals

- Sensor specifications (Sensitivity, Non Linearity, Hysteresis, Resolution, Accuracy, Offset, Response time, Bandwidth)

- Displacement and speed sensors (Optical encoders)

- Pressure, force sensors (Strain gauge, Piezoelectric sensors)

- Temperature sensors (RTD, Thermistors, Thermocouples)

- Current sensors (Shunt resistance, Hall effect sensor, Current transformer).

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Subject notes	Craig A. Kluever, Dynamic systems: Modeling, Simulation and Control, 1st edition (2015), ISBN: 978-1-118-28945-7.

Moodle Platform	W. Bolton, Instrumentation and control systems, ISBN: 978-0-7506-6432-0 (paper), ISBN: 978-0-0804-7039-9 (online) Paul P.L. Regtien, Sensors for mechatronics, ISBN: 978-0-1239-1497-2 (paper), ISBN: 978-0-1239-4409-2 (online) http://katalogoa.mondragon.edu/janium-bin/janium_login_opac_re_lnk.pl?grupo=MECATRONICA32&ejecuta=10&_ST