[GJK106] INSTRUMENTATION AND CONTROL

GENERAL INFORMATION

Studies	DEGREE IN MECHATRONICS ENGINEERING			**Subject**	?
Semester	2	**Course**	3	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2020	**Modality**	Adapted Face-to-face	**Language**	ENGLISH
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
VALERA GARCIA, JUAN JOSE

REQUIRED PREVIOUS KNOWLEDGE

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

SKILLS

VERIFICA SKILLS

SPECIFIC

GJCE14 - Knowledge of electronic instrumentation, automatic regulation and control techniques and their application to industrial automation.

GENERAL

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

GJCG06 - Implement and materialize projects of automation and control of equipment, processes and flexible industrial systems, through the integration of hardware and software in order to optimize the operation of the different units that make up the system to meet the needs of the productive sector

LEARNING RESULTS

RG301 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
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
Self-assessment	30%
Co-assessment	35%
Observation (technical capacity, attitude and participation)	35%

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.

RG302 They analyze the variables involved in the problem and propose actions for a stable situation.

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
Observation (technical capacity, attitude and participation)	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.

RG304 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	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
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%

MAKE-UP MECHANISMS

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

Comments: Revision and correction of the written report of the semester project

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

RG305 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	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
Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems	100%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

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

RGJ322 They design and implement measurement systems in industrial applications

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
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	50%

MAKE-UP MECHANISMS

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

Comments: If a retake exam is needed, the final mark will be obtained 25% first mark and 75% the retake mark.

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

RGJ3323 They implement basic closed-loop control systems

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

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

Comments: If a retake exam is needed, the final mark will be obtained 25% first mark and 75% the retake mark.

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

Subject notes
Moodle Platform

Bibliography

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

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