

[MRA105] SYNCHRONISED AXES CONTROL

GENERAL INFORMATION

Studies	Master's Degree in ROBOTICS AND CONTROL SYSTEMS		Subject	?	
Semester	2	Course	1	Mention / Field of specialisation	AUTOMATION
Character	OPTIONAL		Language	CASTELLANO/EUSKARA	
Plan	2023	Modality	Face-to-face	Total hours	59 class hours + 91 non-class hours = 150 total hours
Credits	6	Hours/week	0		

PROFESSORS

AZURMENDI URTEAGA, ASIER

 ARRATIBEL GARCIA, ANDONI

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
BASIC INDUSTRIAL AUTOMATION	(No previous knowledge required)
BASIC PROGRAMMING	

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
M1R203 - [!] <i>Aplicar soluciones de accionamientos multieje para movimientos de ejes sincronizados e interpolados según requerimientos requeridos</i>			x	5,2
M1R223 - [!] <i>Capacidad de trabajar en equipos multidisciplinares y en un entorno multilingüe y de comunicar, tanto de forma oral como escrita, conocimientos, procedimientos, resultados e ideas relacionadas con los temas afines al máster</i>		x		0,2
M1R224 - [!] <i>Capacidad para ejercer su profesión con actitud cooperativa y participativa, y con responsabilidad social</i>		x		0,2
M1R225 - [!] <i>Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.</i>		x		0,4
Total:				6

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

SECONDARY LEARNING RESULTS

RA041 [!] *Diseña, desarrolla y valida el programa de control de posición de un eje mediante funciones estándares predefinidas*

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	5 h.	9 h.	14 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	8 h.	11 h.	19 h.
Practical work in workshops and/or laboratories, individually and/or in teams	1 h.	6 h.	7 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		Individual written and/or oral tests or individual coding/programming tests
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	20%	
Individual written and/or oral tests or individual coding/programming tests	80%	

Comments: Laboratory practices are mandatory to carry out the evaluation of the PBL project. All activities (control points, individual and group work, etc.) must have a minimum grade of 5 and an opportunity for recovery (except the PBL). In unapproved training activities (less than 5) the recovery is compulsory and the final grade will be the grade obtained in the recovery. In the activities carried out it is necessary to obtain a minimum mark of 4 to calculate the average mark of the learning result. Otherwise, the note of the learning result will be that of the suspended activity. The system will calculate the final grade with the RA, applying the percentages defined in IKOF.

CH - Class hours: 14 h.
NCH - Non-class hours: 26 h.
TH - Total hours: 40 h.

RA042 [!] *Diseña, desarrolla y valida el programa de control de sincronismo multi-ejes utilizando funciones estándares predefinidas trabajando individualmente y en equipos multidisciplinares*

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	9 h.	10 h.	19 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	10 h.	15 h.	25 h.
Practical work in workshops and/or laboratories, individually and/or in teams	1 h.	5 h.	6 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			
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	20%		
Individual written and/or oral tests or individual coding/programming tests	80%		

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

Comments: Laboratory practices are mandatory to carry out the evaluation of the PBL project. All activities (control points, individual and group work, etc.) must have a minimum grade of 5 and an opportunity for recovery (except the PBL). In unapproved training activities (less than 5) the recovery is compulsory and the final grade will be the grade obtained in the recovery. In the activities carried out it is necessary to obtain a minimum mark of 4 to calculate the average mark of the learning result. Otherwise, the note of the learning result will be that of the suspended activity. The system will calculate the final grade with the RA, applying the percentages defined in IKOF.

CH - Class hours: 20 h.
NCH - Non-class hours: 30 h.
TH - Total hours: 50 h.

RA043 [!] *Diseña, desarrolla y valida el programa de control de interpolación de ejes lineal, circular, etc. utilizando las funciones estándares predefinidas buscando la originalidad de la propuesta y colaborando de manera activa para evaluar y asumir la respo*

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	10 h.	10 h.	20 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	10 h.	15 h.	25 h.
Practical work in workshops and/or laboratories, individually and/or in teams	5 h.	10 h.	15 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			
Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree	20%		

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

project, master's thesis, challenges and problems

 Individual written and/or oral tests or individual coding/programming tests 80%

Comments: Laboratory practices are mandatory to carry out the evaluation of the PBL project. All activities (control points, individual and group work, etc.) must have a minimum grade of 5 and an opportunity for recovery (except the PBL). In unapproved training activities (less than 5) the recovery is compulsory and the final grade will be the grade obtained in the recovery. In the activities carried out it is necessary to obtain a minimum mark of 4 to calculate the average mark of the learning result. Otherwise, the note of the learning result will be that of the suspended activity. The system will calculate the final grade with the RA, applying the percentages defined in IKOF.

CH - Class hours: 25 h.

NCH - Non-class hours: 35 h.

TH - Total hours: 60 h.

CONTENTS

Introduction to Programmable Logic Controllers (PLC) for movement control

- Basic PLC operation (B&R)
- Usage and configuration of the development environment (Automation Studio)

Single axis manipulation

- Theoretical foundations and single axis configurations
- Diagnosis of single axis movement problems
- Analysis and validation of different types of movements

Multiple axes manipulation

- Synchronism and different types of synchronisations
- Configuration of synchronous axes
- Diagnosis of synchronous axes movement problems
- Analysis and validation of different types of movements of synchronous axes
- Analysis of the interpolation between axes

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Moodle Platform

 Specific Master Software

<https://www.br-automation.com/en/academy/>

Bibliography

Brunner Hubert (2013). "Motion". Bernecler & Rainer

 Markus Ritchter (2013). "TA417TRN.433_ENG_CrossCutter". Bernecler & Rainer

 Markus Ritchter (2013). "TA417TRN.433_ENG_Flying Saw". Bernecler & Rainer

 Radak Alexander (2013). "TA417TRN.433-ENG_Labeller". Bernecler & Rainer