[MHA301] ADVANCED INDUSTRIAL PROCESS AUTOMATION

GENERAL INFORMATION

Studies	UNIVERSITY MASTER IN INDUSTRIAL ENGINEERING			**Subject**	?
Semester	1	**Course**	1	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2025	**Modality**	Face-to-face	**Language**	CASTELLANO
Credits	5	**Hours/week**	3	**Total hours**	54 class hours + 71 non-class hours = **125 total hours**

2030 AGENDA GOALS

PROFESSORS

FERNANDEZ ARRIETA, MIGUEL
ZALDIBIA GARATE, JOSEBA EDORTA
SAEZ DE BURUAGA CORRALES, ASIER
MITXELENA MARTIARENA, EKHI
ARRATIBEL GARCIA, ANDONI

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
Basic industrial automation	Grafcet (modeling language)
Basic programming	Basic interpretation of electrical diagrams
	[!] *Lenguajes norma IEC 611313-1 (Ladder, SFC)*

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
MH2502 - Project, calculate and design integrated manufacturing systems.		x		2
MH2508 - Design and project automated production systems and advanced process control.		x		2,44
MH2526 - Apply acquired knowledge and problem-solving skills in new, unfamiliar or changing environments within broader (or multidisciplinary) contexts related to their area of study.		x		0,24
MH2528 - Communicate its conclusions and the ultimate knowledge and rationale behind them to specialized and non-specialized audiences in a clear and unambiguous manner.		x		0,16
MH2530 - Work with people, involving them and leading them in a dynamic directed towards a common objective that includes reflection on their ethical and social responsibility, with a global vision of the work to be carried out and the characteristics required (quality, deadlines, etc.), assuming responsibility for the decisions taken.		x		0,16
			Total:	5

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

SECONDARY LEARNING RESULTS

RMH101 **[!]** ***Diseña el algoritmo, desarrolla el programa de PLC para procesos de fabricación avanzada que cumpla el estándar IEC-61131-3, valida y realiza la puesta en marcha mediante Gemelo Digital, integrando la conectividad de un sistema automático.***

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.	10 h.	12 h.
Computer simulation exercises, individually and/or in teams	10 h.	15 h.	25 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	14 h.		14 h.
Carrying out exercises and solving problems individually and/or in teams	10 h.	16 h.	26 h.

Comments: All training activities (checkpoints, individual and group assignments, etc.) must have a minimum grade (5 minimum) and a recovery opportunity. In the case of a checkpoint recovery, the final grade will be the recovery grade. Failed assignments, practical work, etc., must be retaken and will be graded with a maximum of 5.

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	40%	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	60%	Individual written and/or oral tests or individual coding/programming tests

CH - Class hours: 36 h.
NCH - Non-class hours: 41 h.
TH - Total hours: 77 h.

RMH103 **[!]** ***Evalúa el riesgo según la norma ISO 12.100, realiza el estudio, define e implementa la solución técnica requerida según la norma EN ISO 13.849-1 relativa a la seguridad de las máquinas.***

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	1 h.	7 h.	8 h.
Computer simulation exercises, individually and/or in teams	1 h.	4 h.	5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	6 h.		6 h.
Carrying out exercises and solving problems individually and/or in teams	1 h.	4 h.	5 h.

Comments: All training activities (checkpoints, individual and group assignments, etc.) must have a minimum grade (5 minimum) and a recovery opportunity. In the case of a checkpoint recovery, the final grade will be the recovery grade. Failed assignments, practical work, etc., must be retaken and will be graded with a maximum of 5.

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	40%	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	60%	Individual written and/or oral tests or individual coding/programming tests

CH - Class hours: 9 h.
NCH - Non-class hours: 15 h.
TH - Total hours: 24 h.

RMH102 **[!]** ***Diseña, desarrolla y valida los Sistemas de Supervisión e Historizadores para aplicaciones MES que cumplan con los requisitos especificados, tanto a nivel local como en sistemas basados en buses de campo.***

LEARNING ACTIVITIES	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	1 h.	7 h.	8 h.
Computer simulation exercises, individually and/or in teams	1 h.	4 h.	5 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	6 h.		6 h.
Carrying out exercises and solving problems individually and/or in teams	1 h.	4 h.	5 h.

Comments: All training activities (checkpoints, individual and group assignments, etc.) must have a minimum grade (5 minimum) and a recovery opportunity. In the case of a checkpoint recovery, the final grade will be the recovery grade. Failed assignments, practical work, etc., must be retaken and will be graded with a maximum of 5.

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	40%	Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems
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CH - Class hours: 9 h.
NCH - Non-class hours: 15 h.
TH - Total hours: 24 h.

CONTENTS

PLC programming

- Processing of numerical variables
- Analog signals
- Data types
- Functions
- Interrupts
- PID control
- Digital twin

HMI

- HMI configuration
- Definition of the template and its use in context
- Graphical interface programming, Popup and Shift screens
- Alarms and data logging
- Recipes and trends
- User administration

Industrial communications

- TCP-IP architecture
- Network devices (switches and routers)
- PROFINET
- OPC-UA

Machine safety

- EU Regulation 2023/1230 (CE marking, UNE-EN 12.100:2012, UNE-EN ISO 13849-1/2:2016), NIS2 Directive (cybersecurity)
- Software handling (verification PL≥PLr)
- Safety programming-Siemens CPU 1516F

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Subject notes	Penín AR. Sistemas Scada-Guía Práctica. Marcombo; 2007
Topic related web quires	Pérez EM, Acevedo JM, Silva CF. Autómatas programables y sistemas de automatización. Marcombo; 2009
Moodle Platform	
Computer practical training	