[MSC003] Real-time systems

GENERAL INFORMATION

Studies	MASTER DEGREE IN SMART ENERGY SYSTEMS			**Subject**	Energy management and control
Semester	2	**Course**	1	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2022	**Modality**	Face-to-face	**Language**	CASTELLANO
Credits	4,5	**Hours/week**	0	**Total hours**	63 class hours + 49.5 non-class hours = **112.5 total hours**

PROFESSORS

LIZEAGA GOIKOETXEA, AITOR
HERNANDEZ GONZALO, JUAN CARLOS

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
MICROPROCESSORS	Microcontrollers programming.

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
MSR131 - Design, program and evaluate real-time power and communications control systems on microprocessors by analysing the timing characteristics		x		4,06
MSR171 - Ability to work in multidisciplinary teams and in a multilingual environment	x		x	0,12
MSR222 - Exhibits, argues and defends the results obtained in the work carried out before a panel of judges			x	0,16
MSR251 - Develops a project in the field of energy systems in a practical application context		x		0,16
			Total:	4,5

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

SECONDARY LEARNING RESULTS

RMS115 **[!]** ***Diseñar, programar y evaluar sistemas de control de energía y comunicaciones en tiempo real en microprocesadores analizando las características temporales***

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	21 h.	12,5 h.	33,5 h.
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2 h.		2 h.
Computer simulation exercises, individually and/or in teams	8 h.	13 h.	21 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	24 h.		24 h.
Carrying out exercises and solving problems individually and/or in teams	8 h.	13 h.	21 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	20%
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	33%
Individual written and/or oral tests or individual coding/programming tests	47%

MAKE-UP MECHANISMS

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

CH - Class hours: 63 h.
NCH - Non-class hours: 38,5 h.
TH - Total hours: 101,5 h.

RMS171 **[!]** ***Es capaz de trabajar en equipos multidisciplinares y en un entorno multilingüe***

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		3 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)*

CH - Class hours: 0 h.
NCH - Non-class hours: 3 h.
TH - Total hours: 3 h.

RMS222 **[!]** ***Expone, argumenta y defiende ante un tribunal los resultados obtenidos en el trabajo desarrollado***

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		4 h.	4 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)*

CH - Class hours: 0 h.
NCH - Non-class hours: 4 h.
TH - Total hours: 4 h.

RMS251 **[!]** ***Desarrolla un proyecto del ámbito de los sistemas energéticos en un contexto de aplicación práctica***

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		4 h.	4 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)*

CH - Class hours: 0 h.
NCH - Non-class hours: 4 h.
TH - Total hours: 4 h.

CONTENTS

Theoretical contents:

1. Operating systems.
2. Concurrent programming.
3. Real-time operating systems.
4. Time-driven / periodic scheduling.
5. Event-driven / aperiodic scheduling.
6. Real-time operating systems - FreeRTOS.

Practical work:

Practical exercises on programming real-time systems:

1. Practices with evaluation board NUCLEO STM 32.
2. Practices with evaluation board LAUNCHXL-F28379D.

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
Subject notes	https://labur.eus/9VvKY
Moodle Platform	
Slides of the subject	
Class presentations	
Computer practical training	