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#### Mondragon Unibertsitatea Goi Eskola Politeknikoa Escuela Politécnica Superior

Course: 2024 / 2025 - Course planning

	GENERA	AL INFORMATION	_			
Studies DEGREE IN ME		IG Subject	?			
Semester 1	Course 4	Mention / Field of specialisation				
	Madality Face to f					
	Hoursbuck 2 75	Tace Language	EUSKARA/CAS	TELLANO/		112 /
Creaks 4,5	Hours/week 5.75	Total nours	hours	5 + 45 11011-0	JIA55 11001	5 = <u>112.</u> .
	2030 A	GENDA GOALS				
A KAN A MANTA O ARAWATARICIAL						
	PR	OFESSORS				
ANDONEGI ARTEGUI, IMAN	NOL					
ALONSO NIETO, MARCOS						
SEIJO BARQUIN, IRAIDE						
	REQUIRED PF	REVIOUS KNOWLED	GE			
Subje	ects		Knowl	edge		
DAMENTALS OF COMPUTING	G SCIENCE	(1	No previous know	vledge requ	ired)	
THEMATICS I						
THEMATICS II						
	LEAR					
ARNING RESULTS	inciples of repetie systems or	ad artificial vision		KC SK	AB	ECTS
<b>1404</b> - To know and apply the pri	Incipies of robotic systems ar	id artificial vision	nlovity	Y	X	4,02
erent manner, orally and in writi rces, using inclusive and non-di	ng, based on quality informat scriminatory language	tion, self-made or obtained	from different	X		0,24
					Total:	4,5
Knowledge or Content / SK: Skills / AB:	Abilities					
	SECONDARY	LEARNING RESUL	ГS			
<b>GJ412</b> [!] Obtiene el modelo formación adquirida mediante	cinemático de un robot de e un sistema de visión artifi	n grados de libertad. Pro cial	gramación de u	n robot ind	lustrial ba	isada en
GJ412 [!] Obtiene el modelo 'ormación adquirida mediante .EARNING ACTIVITIES	cinemático de un robot de e un sistema de visión artifi	n grados de libertad. Pro cial	gramación de u CH	n robot ina NCH	lustrial ba Th	isada en
GJ412 [!] Obtiene el modelo formación adquirida mediante EARNING ACTIVITIES Carrying out/resolving projects/cl nterdisciplinary contexts, real an	cinemático de un robot de e un sistema de visión artifi hallenges/cases, etc. to provi id/or simulated, individually a	n grados de libertad. Pro icial ide solutions to problems in nd/or in teams	gramación de u CH 6 h.	n robot ind NCH 12 h.	lustrial ba Th 18	nsada en n h.
GJ412 [!] Obtiene el modelo formación adquirida mediante EARNING ACTIVITIES Carrying out/resolving projects/cl nterdisciplinary contexts, real an EVALUATION SYSTEM	cinemático de un robot de e un sistema de visión artifi hallenges/cases, etc. to provi id/or simulated, individually a	n grados de libertad. Pro icial ide solutions to problems in nd/or in teams	gramación de u <u>CH</u> 6 h. IANISMS	n robot ind NCH 12 h.	lustrial ba	h.
CJ412 [!] Obtiene el modelo Formación adquirida mediante EARNING ACTIVITIES Carrying out/resolving projects/ch nterdisciplinary contexts, real an EVALUATION SYSTEM Presentation and defence of exe omputer practical work, simulati aboratory practical work, term pr roject, master's thesis, challeng	cinemático de un robot de e un sistema de visión artifi hallenges/cases, etc. to provi id/or simulated, individually a rcises, case studies, 1 rojects, end of degree les and problems	n grados de libertad. Pro- icial   ide solutions to problems in nd/or in teams   M   MAKE-UP MECH   100%   Presentation and practical work, sin term projects, end and problems	gramación de u CH 6 h. ANISMS defence of exerc nulation practical d of degree projec	n robot ind NCH 12 h. ises, case s work, labor ct, master's	Iustrial ba	nsada en h. mputer tical wor allenges

RGJ410 [!] Diseña, implementa y valida un sistema de visión artificial para una aplicación industrial



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Superior LEARNING ACTIVITIES СН NCH TH 2 h. 2 h. Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints Presentation by the teacher in the classroom, in participatory classes, of concepts and 10 h. 5 h. 15 h. procedures associated with the subjects 7 h. Carrying out exercises and solving problems individually and/or in teams 3 h. 10 h. **EVALUATION SYSTEM** W MAKE-UP MECHANISMS Individual written and/or oral tests or individual 100% Individual written and/or oral tests or individual coding/programming tests coding/programming tests CH - Class hours: 19 h. NCH - Non-class hours: 8 h. TH - Total hours: 27 h.

**RGJ491** [!] 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			СН	NCH	ТН
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 MECHAN	ISMS		
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100% Comments: Continue		(No mech ous assessm	<i>anisms)</i> ent. Retake is	not foreseen.
<b>;H - Class hours:</b> 1 h. <b>ICH - Non-class hours:</b> 2 h. <b>'H - Total hours:</b> 3 h.					

**RCJ493** [!] Elabora la memoria del proyecto, aportando argumentos elaborados y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.

Development and writing of records, reports, presentatio projects/work experience/challenges/case studies/experi individually and/or in teams	ns, audiovis mental inve	sual material, etc. on estigations carried out	2 h.	1 h.	3 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANI	SMS		
Reports on the completion of exercises, case studies,	100%		(No mech	anisms)	
computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems		<b>Comments:</b> Continuous assessment. Retake is not forese			not foreseen.
CH - Class hours: 2 h. ICH - Non-class hours: 1 h.					
<b>'H - Total hours:</b> 3 h.					

LEARNING ACTIVITIES	СН	NCH	ТН
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	2,5 h.		2,5 h.

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Goi Eskola Politeknikoa Escuela Politécnica

Superior					
Presentation by the teacher in the classroom, in participate procedures associated with the subjects	ory classes	s, of concepts and	20 h.	5 h.	25 h.
Carrying out exercises and solving problems individually a	nd/or in tea	ams	14 h.	14 h.	28 h.
EVALUATION SYSTEM	w	MAKE-UP MECHANI	SMS		
Individual written and/or oral tests or individual coding/programming tests	100%	Individual written and/ coding/programming to	or oral tests o ests	or individual	
CH - Class hours: 36,5 h. NCH - Non-class hours: 19 h. TH - Total hours: 55,5 h.					
<b>RGJ490</b> [!] Definir y gestionar los objetivos y la planifi conocimientos de tecnologías específicas de su especi definir una estrategia	icación de alidad,- qu	e un proyecto que pern ue en ocasiones llegan	nita adquirir a la vangua	y/o reforzar l rdia del conc	os ocimiento- y
LEARNING ACTIVITIES			СН	NCH	тн
Carrying out/resolving projects/challenges/cases, etc. to printerdisciplinary contexts, real and/or simulated, individual	rovide solu y and/or in	itions to problems in teams	1 h.	2 h.	3 h.
EVALUATION SYSTEM	w	MAKE-UP MECHANI	SMS		
CH - Class hours: 1 h. NCH - Non-class hours: 2 h. TH - Total hours: 3 h.	100%	Comments: Continuo	(No mecha us assessme	anisms) nt. Retake is i	not foreseen.
<b>RGJ494</b> [!] Realiza una presentación oral del proyecto precisos, y haciendo un uso correcto, inclusivo y no dis	, justifica scriminato	ndo las soluciones pro prio del lenguaje.	puestas cor	n argumentos	elaborados y
LEARNING ACTIVITIES			CH	NCH	TH
Development and writing of records, reports, presentations projects/work experience/challenges/case studies/experim individually and/or in teams	s, audiovis iental inves	ual material, etc. on stigations carried out	2 h.	1 h.	3 h.
EVALUATION SYSTEM	W	MAKE-UP MECHANI	SMS		
Reports on the completion of exercises, case studies,	100%		(No mecha	anisms)	
computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems		Comments: Continuo	us assessme	nt. Retake is r	not foreseen.
CH - Class hours: 2 h. NCH - Non-class hours: 1 h. TH - Total hours: 3 h.					

[!]

CONTENTS

Conceptos básicos de simulación y programación de robots

-Fundamentos del entorno de simulación.

-Fundamentos de posición y orientación relativos y transformaciones entre distintos sistemas cartesianos de referencia.

-Programación básica de un robot industrial, puntos y trayectorias.



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-Definición y caluibración de una herramienta embarcada en un robot.

-Fundamentos de programación en el lenguaje de programación específico del robot.

-Programación de Sockets.

### Visión artificial

-Fundamentos de imágenes y cámaras.

-Filtrado de imágen.

-Operadores morfológicos.

-Metrología 2D.

-Programación de un sistema robot-cámara.

LEARNING RESOURCES AND BIBLIOGRAPHY					
Learning resources	Bibliography				
[!] Laboratorios	ABB Robotics Technical reference manual RAPID Instructions,				
[!] Plataforma Moodle	Functions and Data types (Online, fopen access)				
[] Presentaciones en clase	ABB Robotics Operating manual RobotStudio (Online, open access)				
	Richard Szeliski - Computer Vision Algorithms and Applications				
	Rafael C. Gonzalez and Richard E. Woods - Digital Image Processing 4th Ed.				
	MVTEC Halcon Documentation - (Online, open access)				
	John J. Craig. introduction to Robotics: Mechanics and Control. Pearso, 3rd editon. 2005				