[MRC102] ROBOT PROGRAMMING

GENERAL INFORMATION

Studies	Master's Degree in ROBOTICS AND CONTROL SYSTEMS			**Subject**	?
Semester	1	**Course**	1	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2023	**Modality**	Face-to-face	**Language**	CASTELLANO/EUSKARA
Credits	6	**Hours/week**	0	**Total hours**	60 class hours + 90 non-class hours = **150 total hours**

PROFESSORS

ELKOROBARRUTIA LETONA, XABIER
ALONSO NIETO, MARCOS

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
(No specific previous subjects required)	Basic programming concepts

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
M1R211 - [!] *Programar un robot para que se obtenga el comportamiento cinemático deseado*			*x*	4,4
M1R223 - [!] *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*		*x*		0,4
M1R224 - [!] *Capacidad para ejercer su profesión con actitud cooperativa y participativa, y con responsabilidad social*		*x*		0,4
M1R226 - To apply the knowledge acquired and your problem-solving skills in new, little-known or changing environments within broader (or multidisciplinary) contexts related to your area of study		*x*		0,8
			Total:	6

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

SECONDARY LEARNING RESULTS

RA121 **[!]** ***Programa el robot para la realización de una tarea comunicando sus conclusiones de manera argumentada***

LEARNING ACTIVITIES	CH	NCH	TH
Computer simulation exercises, individually and/or in teams	10 h.	45 h.	55 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	10 h.		10 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	20%
Individual written and/or oral tests or individual coding/programming tests	80%

MAKE-UP MECHANISMS

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

Comments: 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: 45 h.
TH - Total hours: 65 h.

RA122 **[!]** ***Programa el robot para la realización de una tarea dentro de un contexto real o simulado resolviendo los problemas asociados a la solución propuesta y colaborando de manera activa para evaluar y asumir la responsabilidad social implícita en la***

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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	10 h.	45 h.	55 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	30 h.		30 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	20%
Individual written and/or oral tests or individual coding/programming tests	80%

Comments: 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.

MAKE-UP MECHANISMS

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

CH - Class hours: 40 h.
NCH - Non-class hours: 45 h.
TH - Total hours: 85 h.

CONTENTS

Industrial Robot Case Study: ABB Robot Studio and IRB 140:

1. Robot Programming Environment2. Basic concepts: Targets, work object, paths, …3. Programing with RAPID4. Interacting with the environment with I/Os5. Interacting with the robot through ETHERNET

ROS

1. Introduction to ROS2. Publisher/subscriber and client/server models3. Development tools4. Simulation: RVIZ/Gazebo

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Moodle Platform
Specific Master Software
Slides of the subject
Labs
Topic related web quires

Bibliography

Mastering ROS for Robotics Programming: Best practices and troubleshooting solutions when working with ROS Lentin Joseph & Jonathan Cacace. Packt Publishing, 3rd edition, 2021