

[MRC102] ROBOT PROGRAMMING

GENERAL INFORMATION

| | | | |
|------------------|---|--|--|
| Studies | Master's Degree in ROBOTICS AND CONTROL SYSTEMS | Subject | ? |
| Semester | 1 | Course | 1 |
| Character | COMPULSORY | Mention / Field of specialisation | |
| Plan | 2023 | Modality | Face-to-face |
| Credits | 6 | Language | ENGLISH |
| | | 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 - Programming a robot to obtain the desired kinematic behaviour | | | x | 4,4 |
| M1R223 - Ability to work in multidisciplinary teams and in a multilingual environment and to communicate, both orally and in writing, knowledge, procedures, results and ideas related to subjects related to the Master's degree | | x | | 0,4 |
| M1R224 - To be able to do their job in cooperative, participatory environments, with awareness of social responsibility. | | 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

| | |
|--|-----|
| 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). If a control point is not passed (less than a 5), the retake is mandatory and the final grade will be the grade obtained in the retake. If an individual or group work is not passed (less than 5), the retake is mandatory and the final grade will be a maximum of 5. 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 propue

LEARNING ACTIVITIES

Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams

CH

10 h.

NCH

45 h.

TH

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%

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). If a control point is not passed (less than a 5), the retake is mandatory and the final grade will be the grade obtained in the retake. If an individual or group work is not passed (less than 5), the retake is mandatory and the final grade will be a maximum of 5. 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: 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 h 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
Documentation for Active ROS Distributions --> <https://docs.ros.org/>