

[MRD004] INTERNET OF THINGS TECHNOLOGIES

GENERAL INFORMATION

Studies	Master's Degree in ROBOTICS AND CONTROL SYSTEMS		Subject	Interoperability Control Systems	
Semester	2	Course	1	Mention / Field of specialisation	AUTONOMOUS SYSTEMS - EIT
Character	OPTIONAL		Modality	Adapted Face-to-face	
Plan	2019		Language	ENGLISH	
Credits	3	Hours/week	0	Total hours	43 class hours + 32 non-class hours = 75 total hours

PROFESSORS

ALONSO GOMEZ, ARRATE

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
SENSORS AND MEASUREMENTS	(No previous knowledge required)

SKILLS

VERIFICA SKILLS

SPECIFIC

MRCE19 - Developing and launching an IoT infrastructure, from the sensor through the control system and up to the cloud, using state-of-the-art communication technologies

GENERAL

MRCG01 - Automating, controlling, maintaining and providing intelligence to industrial processes and autonomous systems while directing innovative projects that guarantee their availability, using and integrating cutting-edge technologies in both industrial and scientific environments, with the ability to deliver advice on the most appropriate alternatives considering the specifications of users and current regulations

CROSS

MRCTR1 - 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

MRCTR2 - Ability to do their job with a cooperative and participatory attitude, while being socially responsible

BASIC

M_CB10 - To have learning skills and the capacity for self-guided or independent subsequent learning.

LEARNING RESULTS

RA191 Designs an appropriate approach for solving a use case of remote data acquisition systems, ensuring his/her ability to adapt to situations where new knowledge is required to be learned.

LEARNING ACTIVITIES

	CH	NCH	TH
Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints	8 h.		8 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	20 h.		20 h.
Carrying out exercises and solving problems individually and/or in teams		12 h.	12 h.

EVALUATION SYSTEM

	W
Individual written and/or oral tests or individual coding/programming tests	100%

MAKE-UP MECHANISMS

Individual written and oral tests to assess technical skills of the subject

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: 28 h.
NCH - Non-class hours: 12 h.
TH - Total hours: 40 h.

RA192 Implements an infrastructure of remote data acquisition systems cooperating and working individually and in multidisciplinary teams

LEARNING ACTIVITIES

	<i>CH</i>	<i>NCH</i>	<i>TH</i>
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	15 h.	20 h.	35 h.

EVALUATION SYSTEM

	<i>W</i>
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	50%
Individual written and/or oral tests or individual coding/programming tests	50%

MAKE-UP MECHANISMS

Individual written and oral tests to assess technical skills of the subject

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: 15 h.

NCH - Non-class hours: 20 h.

TH - Total hours: 35 h.

CONTENTS

1. Introduction to IoT: **From devices to the cloud**
2. Embedded Systems and **IoT devices**
 1. *Embedded Platforms and communications for IoT*
 2. *Sensor networks*
 3. *Cyberphysical system modelling*
3. Achitecture of IoT Services
 1. a. *Distributed Systems for IoT*
 2. b. *Architectures and plataforms for IoT services*
4. Information and knowledge management in IoT: **Cloud**Computing Systems
 1. *Cloud computing system and IoT programming*

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Technical articles
Subject notes

Bibliography

B. Baesens, "Analytics in a Big Data World", Wiley 2014

G. Perrone et al., "Chapter 1-The Internet of things: a survey and outlook", 2019 (https://digital-library.theiet.org/content/books/10.1049/pbce122e_ch1)

V. Kartsch et al. "An Energy-Efficient IoT node for HMI applications based on an ultra-low power Multicore Processor", IEEE Instrumentation and Measurement Society, 2019

L. Lednicki et al. "Industrial IoT with Distributed Cloud Experiments using 5G LTE", 15th IEEE International Workshop on Factory Communication Systems (WFCS), 2019

T. Madhu Perkin et al. "Assignment of IoT Nodes to Edge Computing Devices in Internet of Things", European Conference on Networks and Communications (EuCNC), 2019

D. Wang et al. "From IoT to 5G I-IoT:The Next Generation IoT-Based Intelligent Algorithms and 5G Technologies", IEEE Communications Magazine, 2018