UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: INTERNET OF THINGS
Code: 42409
Type: ELECTIVE
ECTS credits: 6
Degree: 405 - DEGREE IN COMPUTER SCIENCE ENGINEERING (TA)
Academic year: 2022-23
Center: 15 - FACULTY OF SOCIAL SCIENCES AND INFORMATION TECHNOLOGIES
Group(s): 60
Year: 4
Duration: C2
Main language: Spanish
Second language: Spanish
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **RUBÉN CANTARERO NAVARRO** - Group(s): **60**

Building/Office	Department	Phone number	Email	Office hours
2.4	TECNOLOGÍAS Y SISTEMAS DE INFORMACIÓN		Ruben.Cantarero@uclm.es	https://www.uclm.es/toledo/fcsociales/grado-informatica/profesorado- y-tutorias

2. Pre-Requisites

Knowledge of programming in C/C++, Python and Java. In addition, it is strongly recommended to have passed the subjects of:

- Computer Networks I and II
- Fundamentals of Programming I and II
- Concurrent Programming and Real Time
- Distributed Systems

3. Justification in the curriculum, relation to other subjects and to the profession

Internet of Things is integrated into the complementary training option of the programme of studies, where the main concepts, technologies and tools for the acquisition, transmission and analysis of information in intelligent environments are introduced. In this subject the student acquires the basic skills for understanding the management of networks, sensors or monitoring through the network. To this end, students acquire the necessary knowledge of networks and services in terms of existing protocols, most commonly used technologies, wired and wireless networks.

4. Degree competences achieved in this course

Course competences

Code	Description
BA05	Knowledge about the structure, organization, functioning, and inter connexions of digital programmes, with their application in engineering problems.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CM05	Ability to acquire, formalise, and represent human knowledge in a computable form for the solution of problems throughout a digital system in any application context, especially the one linked to computational aspects, perception, and behaviour in intelligent frames.
INS04	Problem solving skills by the application of engineering techniques.
PER01	Team work abilities.
PER02	Ability to work in an international context.
SI01	Ability to integrate information and communiction technology solutions and entrepeneurial process so as to fulfil the needs for information in organisation, allowing them to meet their goals in an effective and efficient manner, providing them with competitive benefits.
SIS08	Initiative and entrepreneurial abilities.
TI06	Ability to foster systems, applications, and services based on network technologies, including the internet, web, electronic commerce, mulimedia, interactive sercices, and mobile computation.
UCLM02	Ability to use Information and Communication Technologies.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Acquisition of knowledge about Internet of Things development tools, languages, and platforms.

Ability to conceive, design and characterise Internet of Things projects.

Knowledge of the application scenarios of the Internet of Things in the company/market.

Knownledge and understanding of the paradigm of Ubiquitous Computing, Ambient Intelligence and Context Sensitive Environments.

Ability to use tools and develop applications and services that process information and provide intelligence to the environment of organisations.

Use of the theoretical and practical knowledge acquired to implement Ubiquitous Context Sensitive Information Systems.

Additional outcomes

6. Units / Contents

Unit 1: Introduction
Unit 2: IoT network architecture and design
Unit 3: Smart objects
Unit 4: Connecting smart objects
Unit 5: Data and analytics for the IoT
Unit 6: IoT domains
Unit 7: Impact of IoT on business

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	BA05 SI01 TI06 UCLM02	0.72	18	N	-	Teaching of the subject matter by lecturer (MAG)
Individual tutoring sessions [ON-SITE]		BA05 SI01 TI06 UCLM02	0.18	4.5	N	-	Individual or small group tutoring in lecturer¿s office, classroom or laboratory (TUT)
Study and Exam Preparation [OFF-SITE]	Self-study	BA05 CB02 CB05 CM05 INS04 SI01 TI06 UCLM02	2.1	52.5	N	-	Self-study (EST)
Other off-site activity [OFF-SITE]	Practical or hands-on activities	BA05 CB04 CM05 INS04 PER01 PER02 SI01 SIS08 TI06 UCLM02	0.6	15	N	-	Lab practical preparation (PLAB)
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	BA05 CB02 CB04 CM05 INS04 PER01 PER02 SI01 SIS08 TI06 UCLM02	0.6	15	Y	N	Worked example problems and cases resolution by the lecturer and the students (PRO)
Writing of reports or projects [OFF-SITE]	Self-study	BA05 CB02 CB04 CM05 INS04 PER01 PER02 SI01 SIS08 TI06 UCLM02	0.9	22.5	Y	N	Preparation of essays on topics proposed by lecturer (RES)
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	BA05 CB04 CM05 INS04 PER01 PER02 SI01 SIS08 TI06 UCLM02	0.6	15	Y	Y	Realization of practicals in laboratory /computing room (LAB)
Other on-site activities [ON-SITE]	Assessment tests	BA05 CB04 CB05 INS04	0.3	7.5	Y	Y	Partial test 1 of the first half of the syllabus of the subject (EVA)
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4					**Total class time hours: 60**
		Total credits of out of class work: 3.6					**Total hours of out of class work: 90**

As: Assessable training activity
Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Theoretical papers assessment	15.00%	15.00%	Non-compulsory activity that can be retaken. To be carried out before end of teaching period
Final test	45.00%	45.00%	Compulsory activity that can be retaken (rescheduling) to be carried out within the planned exam dates of the final exam call (convocatoria ordinaria).
Laboratory sessions	30.00%	30.00%	Compulsory activity that can be retaken. To be carried out during lab sessions
Oral presentations assessment	10.00%	0.00%	Non-compulsory activity that cannot be retaken. To be carried out during the theory/lab sessions for students in the continuous assessment modality
Total:	**100.00%**	**90.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

In compulsory activities, a minimum mark of 40% is required in order to pass that activity and have the possibility to therefore pass the entire subject. The evaluation of the activities will be global and therefore must be quantified by means of a single mark. If the activity consists of several sections, each section may be evaluated separately provided students are informed in writing of this evaluation criterion at the beginning of the academic year. In the case of the activities that may be retaken (i.e., rescheduling), an alternative activity or test will be offered in the resit/retake exam call (convocatoria extraordinaria).

The final exam will be common for all the theory/laboratory groups of the subject and will be evaluated by the lecturers of the subject in a serial way, i.e., each part of the final exam will be evaluated by the same lecturer for all the students. A student is considered to pass the subject if she/he obtains a minimum of 50 points out of 100, taking into account the points obtained in all the evaluable activities, and also has passed all the compulsory activities.

For students who do not pass the subject in the final exam call (convocatoria ordinaria), the marks of activities already passed will be conserved for the

resit/retake exam call (convocatoria extraordinaria). If an activity is not recoverable, its assessment will be preserved for the resit/retake exam call (convocatoria extraordinaria) even if it has not been passed. In the case of the passed recoverable activities, the student will have the opportunity to receive an alternative evaluation of those activities in the resit/retake exam call and, in that case, the final grade of the activity will correspond to the latter grade obtained.

The mark of the passed activities in any call, except for the final exam, will be conserved for the subsequent academic year at the request of the student, provided that mark is equal or greater than 50% and that the activities and evaluation criteria of the subject remain unchanged prior to the beginning of that academic year.

The failure of a student to attend the final exam will automatically result in her/him receiving a "Failure to attend¿ (no presentado). If the student has not passed any compulsory evaluation activity, the maximum final grade will be 40%.

Non-continuous evaluation:

Students who are unable to attend training activities on a regular basis may apply at the beginning of the semester for the non-continuous assessment mode. Similarly, if a student who is undergoing continuous assessment incurs any circumstance that prevents her/him from regularly attending the classroom-based training activities, she/he may renounce the accumulated mark in continuous assessment and apply for the non-continuous assessment mode.

In the same way, the student may change to the non-continuous evaluation mode as long as she/he has not participated during the teaching period in evaluable activities that together account for at least 50% of the total mark of the subject. If a student has reached this 50% of the total obtainable mark or the teaching period is over, she/he will be considered in continuous assessment without the possibility of changing to non-continuous evaluation mode.

Students who take the non-continuous evaluation mode will be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences), through the assessment systems indicated in the column "Non-continuous evaluation".

In the "non-continuous evaluation" mode, it is not compulsory to keep the mark obtained by the student in the activities or tests (progress test or partial test) taken in the continuous assessment mode.

Specifications for the resit/retake exam:

Evaluation tests will be conducted for all recoverable activities.

Specifications for the second resit / retake exam:

Same characteristics as the resit/retake exam call.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	hours
Individual tutoring sessions [PRESENCIAL][]	4.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	52.5
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	22.5
Writing of reports or projects [AUTÓNOMA][Self-study]	13.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	15
Other on-site activities [PRESENCIAL][Assessment tests]	3.75

General comments about the planning: The subject is taught in 3 x 1,5 hour sessions per week. The planning might experience changes due to unforeseen circumstances.

Global activity

Activities	hours
Individual tutoring sessions [PRESENCIAL][]	4.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	52.5
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	22.5
Writing of reports or projects [AUTÓNOMA][Self-study]	13.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	15
Other on-site activities [PRESENCIAL][Assessment tests]	3.75
Total horas:	111.75

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Hanes, D., Salgueiro, G., Grossetete, P., Barton, R., & Henry, J	IoT fundamentals: Networking technologies, protocols, and use cases for the internet of things	Cisco Press		1587144565	2017	
López, M.	Internet de las cosas. La transformación digital de la sociedad	RA-MA S.A.		8499647995	2019	