

**1. General information****Course:** DISTRIBUTED SYSTEMS**Type:** CORE COURSE**Degree:** 405 - DEGREE IN COMPUTER SCIENCE ENGINEERING (TA)**Center:** 15 - FACULTY OF SOCIAL SCIENCES AND INFORMATION TECHNOLOGIES**Year:** 3**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 42322**ECTS credits:** 6**Academic year:** 2022-23**Group(s):** 60**Duration:** First semester**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** ANA RUBIO RUIZ - Group(s): 60

Building/Office	Department	Phone number	Email	Office hours
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**2. Pre-Requisites**

It is strongly recommended to have passed the subjects of:

- Computer Networks I and II
- Programming Fundamentals I and II
- Operating Systems I
- Concurrent programming and real time

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

Distributed systems are the most complex networked systems developed in IT. This subject is part of the operating systems, distributed systems and networks area, and enables students to learn the fundamental concepts at the core of all those systems in which the network is a critical infrastructure.

The subject of distributed systems provides future graduates in Computer Engineering with the necessary skills for the analysis, design, construction and maintenance of distributed applications.

As professionals, and depending on their specialisation, students will be able to deal with the fundamental elements of distributed applications such as social networks, cloud applications, grid computing, etc.

**4. Degree competences achieved in this course****Course competences**

Code	Description
CO08	Ability to analyse, design, build and maintain applications in a strong, safe, and efficient manner by selecting the most appropriate paradigms and programming languages.
CO10	Knowledge about the features, functions, and structures of operating systems and the design and implementation of applications based on their services.
CO11	Knowledge and application of the features, functions, and structure of distributed systems, computer networks and the internet, and the design and implementation of application based on them.
CO14	Knowledge and application of fundamental principles and basic techniques on parallel, converging, distributed, and real time programming.
INS01	Analysis, synthesis, and assessment skills.
INS04	Problem solving skills by the application of engineering techniques.
INS05	Argumentative skills to logically justify and explain decisions and opinions.
PER01	Team work abilities.
PER02	Ability to work in an international context.
PER04	Interpersonal relationship skills.
PER05	Acknowledgement of human diversity, equal rights, and cultural variety.
SIS01	Critical thinking.
SIS03	Autonomous learning.
UCLM02	Ability to use Information and Communication Technologies.

**5. Objectives or Learning Outcomes****Course learning outcomes**

Description

Application of communication techniques for processes and groups of distributed processes.

Understanding and management of the basic concepts of distributed systems and programme applications in these environments.

Programming of applications that follow the client / server model in network environments.

## 6. Units / Contents

**Unit 1: Introduction to Distributed Systems**

**Unit 2: Protocols Design**

**Unit 3: Remote Invocation**

**Unit 4: Indirect Communication**

**Unit 5: Time and Global States**

**Unit 6: Coordination and Agreement**

**Unit 7: Transactions**

## ADDITIONAL COMMENTS, REMARKS

The study of the different programming paradigms of network applications (especially the client/server model) is one of the main lines of the subject and is approached by means of theoretical/practical exercises both in theoretical classes and in the laboratory.

## 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	CO08 CO10 CO11 CO14	0.72	18	N	-	
Individual tutoring sessions [ON-SITE]		CO08 CO10 CO11 CO14 UCLM02	0.18	4.5	N	-	
Study and Exam Preparation [OFF-SITE]	Self-study	CO08 CO10 CO11 CO14 INS01 SIS01 SIS03	2.1	52.5	N	-	
Other off-site activity [OFF-SITE]	Practical or hands-on activities	CO08 CO10 CO11 CO14 INS01 INS04 INS05 PER01 PER02 PER04 PER05 SIS03	0.6	15	N	-	
Project or Topic Presentations [ON-SITE]	Individual presentation of projects and reports	CO08 CO10 CO11 CO14 INS04 INS05 PER02 PER04 PER05 UCLM02	0.6	15	Y	N	
Writing of reports or projects [OFF-SITE]	Self-study	CO08 CO10 CO11 CO14 INS01 INS04 INS05 PER01 PER02 PER04 PER05 SIS03	0.9	22.5	Y	N	
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	CO08 CO10 CO11 CO14 INS01 INS04 INS05 PER02 PER04 PER05 UCLM02	0.6	15	Y	Y	
Final test [ON-SITE]	Assessment tests	CO08 CO10 CO11 CO14 INS01 INS04 INS05 PER01	0.3	7.5	Y	Y	
<b>Total:</b>			<b>6</b>	<b>150</b>			
<b>Total credits of in-class work: 2.4</b>			<b>Total class time hours: 60</b>				
<b>Total credits of out of class work: 3.6</b>			<b>Total hours of out of class work: 90</b>				

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
Final test	50.00%	50.00%	Compulsory activity that can be retaken (rescheduling) to be carried out within the planned exam dates of the final exam call
Oral presentations assessment	10.00%	10.00%	Non-compulsory activity that can be retaken. To be carried out during the theory/lab sessions for the students who take the continuous assessment mode. The students who take non-continuous assessment mode will be evaluated of this activity through an alternative system in the ordinary call
Laboratory sessions	25.00%	25.00%	Compulsory activity than can be retaken. To be carried out during lab sessions
Theoretical papers assessment	15.00%	15.00%	Non-compulsory activity that can be retaken. To be carried out before end of teaching period
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

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 the compulsory activities, a minimum of 4 out of 10 must be obtained to consider the activity passed and to be able to pass the subject. The assessment of the activities will be global and, therefore, must be expressed with a single mark. If the activity consists of several sections, it may be evaluated individually, informing at the beginning of the course about the evaluation criteria for each section. For activities that can be retaken, there is an alternative activity in the extraordinary exam.

The mid-term tests will be common to all theory/laboratory groups of the subject and will be evaluated horizontally by the teachers of the subject, i.e. each part of the mid-term tests will be evaluated by the same teacher for all students.

The student passes the course if he/she obtains a minimum of 50 points out of 100 with the evaluations of each evaluation activity and passes all the compulsory activities.

The grade of the activities passed in any call, except for the partial tests, will be kept for the next academic year if the student requests it and the training activities and evaluation criteria of the subject are not modified in the next academic year. Also, the grade must be equal to or higher than 50%. Failure to attend any of the theory tests (partial or final) and the laboratory activities will result in the grade of "Failure to attend". That is to say, the student will not obtain the grade of "Failure to attend" if he/she takes any of the theory exams or the laboratory activities. If the student has not passed any compulsory assessment activity, the final mark for the course cannot exceed 4 out of 10.

Students will only use the moodle forums for presenting their doubts or general questions. They will only write to the teachers' e-mail for individual questions.

#### **Non-continuous evaluation:**

Students who are unable to regularly attend face-to-face training activities may request, only at the beginning of the term, to take the non-continuous assessment mode. Similarly, if a student who is taking the continuous assessment mode incurs in any circumstance that prevents him/her from regularly attending the face-to-face training activities, he/she may apply for the non-continuous assessment mode. In this case, notification must be given before the date scheduled for the ordinary exams, in accordance with a deadline that will be established at the beginning of the semester.

Students who choose the non-continuous assessment mode will be graded globally, in 2 annual exams, one ordinary and one extraordinary, assessing 100% of the competences and through the evaluation systems indicated in the column "Non-continuous assessment".

If a change of model from continuous to "non-continuous" assessment is requested and the student has already taken an activity of the first assessment model, the mark obtained in that activity will not be saved for the "non-continuous" assessment.

#### **Specifications for the resit/retake exam:**

The same criteria apply as in the ordinary exam, taking into account the following considerations:

Assessment tests will be held for all recoverable activities.

For students who do not pass the subject in the ordinary exam, the grade of the activities passed will be kept for the extraordinary exam. In the case of passed recoverable activities, the student may take the alternative assessment of these activities in the extraordinary exam and, in this case, the final mark for the activity will correspond to the last mark obtained. The student will not be able to apply for higher marks in the extraordinary call if the subject is passed in the ordinary call.

#### **Specifications for the second resit / retake exam:**

Same characteristics as in the extraordinary call.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
<b>General comments about the planning:</b> The course is taught in three weekly sessions of 1.5 hours each.	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
M. Henning, M. Spruiell	Distributed Programming with Ice	ZeroC, Inc			2017	
Coulouris, George F.	Distributed Systems: Concepts and Design			978-0-273-76059-7	2012	
Tanenbaum, Andrew S.	Sistemas distribuidos: principios y paradigmas			978-970-26-1280-3	2008	