

**1. General information****Course:** COMPUTER NETWORKS II**Type:** CORE COURSE**Degree:** 347 - DEGREE PROGRAMME IN COMPUTER SCIENCE ENGINEERING (CR)**Center:** 108 - SCHOOL OF COMPUTER SCIENCE OF C. REAL**Year:** 2**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 42318**ECTS credits:** 6**Academic year:** 2022-23**Group(s):** 21 20 22**Duration:** C2**Second language:** English**English Friendly:** N**Bilingual:** N

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2. Pre-Requisites

This subject is based on the skills and knowledge acquired in the subjects:

- Computer Networks I
- Programming Fundamentals I and II
- Computer Technology

It is also highly recommended to have taken (or be taking) the following subjects:

- Operating Systems I
- Concurrent and Real Time Programming

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

This subject is integrated into the "Operating Systems, Distributed Systems and Networks" subject of the curriculum and serves as a foundation for the following subjects:

- Network Management and Administration.
- Network Infrastructure Design.
- System and Services Planning and Integration.
- Network Security.
- Network Design and Management (intensification of "Information Technologies").

The subjects "Computer Networks I" and II provide the student with the basic competences, knowledge and skills to understand the problems of data communication and network interconnection (especially Internet). Nowadays, digital communications have an enormous importance in any information technology infrastructure and also in society due to their role in the new paradigms of inter-personal communication.

Specifically, the course "Computer Networks II" is dedicated to deepen the functional aspects of the contents already introduced in the course "Computer Networks I" in addition to introducing other more advanced concepts such as multicasting, dynamic routing protocols, programming client-server applications, etc..

4. Degree competences achieved in this course

Course competences

Code	Description
CO05	Knowledge, administration, and maintenance of systems, services and digital systems.
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.
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.
INS05	Argumentative skills to logically justify and explain decisions and opinions.
PER04	Interpersonal relationship skills.
UCLM02	Ability to use Information and Communication Technologies.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Knowledge and ability to choose and configure the main routing protocols.

Knowledge and capacity to choose and use the appropriate network technology for every case study.

Understanding of the usefulness and operation of the transport layer and application of the TCP / IP architecture.

Application of basic security mechanisms in systems and networks.

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

Ability to choose, install and configure the most suitable interconnection devices and services according to the user's needs.

Understanding of the basic concepts of computer networks and protocol architecture.

6. Units / Contents

Unit 1: Client-Server Applications

Unit 2: Reliability and Flow Control

Unit 3: Congestion Control

Unit 4: Dynamic Routing and Multicasting

Unit 5: Private Networks

Unit 6: VLISM

Unit 7: IPv6

Unit 8: Switching and Virtual LAN

Unit 9: WAN technologies

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	CO05 CO08 CO11	0.72	18	N	-	Teacher's presentation of contents (MAG)
Individual tutoring sessions [ON-SITE]		CO05 CO08 CO11 UCLM02	0.18	4.5	N	-	Individual or small group tutorials in the teacher's office, classroom or laboratory (TUT)
Study and Exam Preparation [OFF-SITE]	Self-study	CO05 CO08 CO11	2.1	52.5	N	-	Individual Study (EST)
Other off-site activity [OFF-SITE]	Practical or hands-on activities	CO05 CO08 CO11 PER04	0.6	15	N	-	Preparation of laboratory sessions (PLAB)
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CO05 CO08 CO11 INS05 PER04 UCLM02	0.6	15	Y	N	Resolution of exercises by teacher and students (PRO)
Writing of reports or projects [OFF-SITE]	Self-study	CO05 CO08 CO11 INS05 PER04	0.9	22.5	Y	N	Resolution of exercises by teacher and students (PRO)
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	CO05 CO08 CO11 INS05 PER04 UCLM02	0.6	15	Y	Y	Programmed practices in the laboratory (LAB)
Other on-site activities [ON-SITE]	Assessment tests	CO05 CO08 CO11 INS05	0.15	3.75	Y	Y	Partial test 1, corresponding to the first half of the subject (EVA)
Other on-site activities [ON-SITE]	Assessment tests	CO05 CO08 CO11 INS05	0.15	3.75	Y	Y	Partial test 2, corresponding to the second half of the course syllabus (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
Final test	0.00%	60.00%	

Assessment of active participation	10.00%	10.00%	
Assessment of problem solving and/or case studies			
Mid-term tests	20.00%	0.00%	Partial Test 1. Compulsory activity that can be retaken (rescheduling). To be carried out at the end of the first half of the teaching period.
Mid-term tests	40.00%	0.00%	Partial Test 2. Compulsory activity that can be retaken. To be carried out within the planned dates of the final exam call. The Partial Test 1 retake will be performed at this date.
Laboratory sessions	20.00%	20.00%	Compulsory activity that can be retaken. To be carried out during lab sessions.
Total:	100.00%	100.00%	

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 partial tests 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). 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 higher grade obtained.

The qualification of the passed activities in any call, except for the partial tests, will be conserved for the next academic year at the request of the student, provided that it is equal or superior to 5 and the training activities and the evaluation criteria of the subject are not modified in the next academic year.

The failure of a student to attend the partial 1 and partial 2 tests 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 this case, a notification by the student must be given before the date scheduled for the tests in the ordinary call, in accordance with a deadline that will be informed at the beginning of the semester.

Students who take the non-continuous assessment 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 assessment".

In the "non-continuous assessment" 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.

In the non-continuous mode, the contents of the activity "Evaluation of participation with achievement in class" will be evaluated by means of a written test on the same day as the official test.

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
Writing of reports or projects [AUTÓNOMA][Self-study]	22.5

Other on-site activities [PRESENCIAL][Assessment tests]	3.75
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.	
Unit 1 (de 9): Client-Server Applications	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Individual tutoring sessions [PRESENCIAL][]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	9
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	11
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	7
Unit 2 (de 9): Reliability and Flow Control	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.5
Individual tutoring sessions [PRESENCIAL][]	1.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	6
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	2
Unit 3 (de 9): Congestion Control	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Unit 4 (de 9): Dynamic Routing and Multicasting	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Individual tutoring sessions [PRESENCIAL][]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	8.5
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	2
Unit 5 (de 9): Private Networks	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Unit 7 (de 9): IPv6	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	6
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	2
Unit 8 (de 9): Switching and Virtual LAN	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Unit 9 (de 9): WAN technologies	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Global activity	
Activities	hours
Individual tutoring sessions [PRESENCIAL][]	4.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	46.5
Other off-site activity [AUTÓNOMA][Practical or hands-on activities]	14
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	13
Writing of reports or projects [AUTÓNOMA][Self-study]	22.5
Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]	13
Other on-site activities [PRESENCIAL][Assessment tests]	3.75
Other on-site activities [PRESENCIAL][Assessment tests]	3.75
Class Attendance (theory) [PRESENCIAL][Lectures]	16
Total horas: 137	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description

Forouzan, Behrouz A.	TCP/IP protocol suite	McGraw-Hill	978-0-07-337604-2	2008
Comer, Douglas E.	Interconectividad de redes con TCP/IP	Pearson Educación	970-26-0000-6 (vol.I	2000
Forouzan, Behrouz A.	Transmisión de datos y redes de comunicaciones	McGraw-Hill	978-84-481-5617-6	2007
Stallings, William	Comunicaciones y redes de computadores	Prentice Hall	978-84-205-4110-5	2008
Tanenbaum, Andrew S.	Redes de computadoras	Pearson Educación	970-26-0162-2	2003