

**COURSE DATA****Data Subject**

Code	34680
Name	Computer network architecture
Cycle	Grade
ECTS Credits	6.0
Academic year	2024 - 2025

Study (s)

Degree	Center	Acad. Period	year
1400 - Degree in Computer Engineering	School of Engineering	3	First term

Subject-matter

Degree	Subject-matter	Character
1400 - Degree in Computer Engineering	14 - Operating systems, distributed systems and networks	Obligatory

Coordination

Name	Department
ORDUÑA HUERTAS, JUAN MANUEL	240 - Computer Science

SUMMARY

The subject of computer network architecture is framed within a subject group of computer networks, which are closely related, divided into two subjects and three subjects. This course is part of the basic knowledge acquired in Fundamentals of Computer Networks, technologies and delving into more advanced network protocols. Concretely, this course belongs to the subject " Sistemas Operativos, Sistemas Distribuidos y Redes". In particular, Fundamentals of computer networks together with computer networks architecture form a field of 12 credits under the name Networks.

It is scheduled in the first semester of the third course in Engineering degree from Informatics (GII). It is a mandatory subject , and it is composed of 6 ECTS credits.

The course has been designed with a methodology adapted to the new European Higher Education Area (EHEA), and central aims in student learning. Matter, and in particular subjects, are designed with a joint plan focused on the methodology of Problem Based Learning (PBL). This method enhances student involvement and support its assessment on an ongoing basis, reinforcing and complementing the knowledge acquired in lectures.



Computer network architectures focuses on expanding the knowledge acquired by the student networks. To this end, studying new technologies through networking applications that use VoIP, MPLS and Multicast. To improve the assimilation of theoretical concepts shall be proposed in a theoretical group which will deploy the technologies seen in the theoretical modules.

The main overall objectives of the course are:

- Acquire a basic knowledge of advanced networking and related protocols in order to understand network applications that use them.
- Learn to conduct a project that requires the assimilation of theoretical content and the deployment of a multimedia network taking into account technical and economic factors.
- Develop collaborative skills, group work and leadership to carry out a project-oriented work.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Prior knowledge required is the subject of Computer and Network Fundamentals course in computers. The course is in the first semester of the second course. Therefore assumes that students already have basic knowledge in the field of engineering and have developed skills in solving problems. Also it is expected that students have learned teamwork dynamics and skills. This knowledge will be reinforced throughout the courses in this area with special emphasis on teamwork skills, project-oriented.

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1400 - Degree in Computer Engineering

- G1 - Ability to design, write, organise, plan, develop and sign projects in the field of computer engineering aimed at the design, development or exploitation of computer systems, services and applications.
- G2 - Ability to lead project activities in the field of information technology, in accordance with both the knowledge and the specific skills acquired in the degree.
- G3 - Ability to design, develop, evaluate and ensure the accessibility, ergonomics, usability and security of computer systems, services and applications, and of the information that these manage.
- G4 - Ability to define, evaluate and select hardware and software platforms for the development and implementation of computer systems, services and applications, in accordance with both the knowledge and the specific skills acquired in the degree.



- G5 - Ability to design, develop and maintain computer systems, services and applications using software engineering methods as an instrument for quality assurance, in accordance with both the knowledge and the specific skills acquired in the degree.
- G6 - Ability to design and develop computer systems and centralised or distributed computer architectures which integrate hardware, software and networks, in accordance with both the knowledge and the specific skills acquired in the degree.
- R5 - Knowledge, management and maintenance of computer systems, services and applications.
- R10 - Knowledge of the features, functionalities and structure of operating systems and ability to design and implement applications based on the services that they provide.
- R11 - Knowledge and application of the features, functionalities and structure of distributed systems, computer networks and Internet, and ability to design and implement applications based on them.
- T12 - Ability to select, design, implement, integrate, evaluate, build, manage, exploit and maintain hardware, software and network technologies, within adequate cost and quality thresholds.
- T14 - Ability to select, design, implement, integrate and manage communication networks and infrastructures in an organisation.
- T16 - Ability to design systems, applications and services based on network technologies, including the Internet, the web, e-commerce, multimedia, interactive services and mobile computing.
- T17 - Ability to understand, implement and manage the security and safety of computer systems.
- S11 - Ability to integrate ICT solutions into business processes in order to meet the information needs of organisations, thus enabling them to achieve their goals effectively and efficiently and providing them with competitive advantage.
- S12 - Ability to determine the requirements of an organisation's information and communication systems, considering safety aspects and compliance with regulations and legislation.
- S13 - Ability to actively participate in the specification, design, implementation and maintenance of information and communication systems.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

This subject leads to the following learning outcomes:

- Team working for accomplishing the design and configurations required, balancing the workload in order to tackle complex problems.
- Ability to access and understand technical literature and the ability to access the information required to know the details of a particular configuration.
- Design a data network with integration of different technologies with different sizes (local, metropolitan, wide area), using both public and private addressing.



- Set up the necessary devices (switches and routers) for the operation of a network and know how to administer the minimum services to be deployed.
- Ability to specify rules to write a specification for the deployment of a network.
- Discuss the elements of security in a computer network.
- Design based programs using the libraries network of transportation and sockets.
- To apply the traffic engineering criteria for deployment of networks with MPLS technologies, QoS and Multicast.
- Understand the advantages and limitations of different technologies used in current networks. The student should acquire the following

In addition, it contributes to the development of the following social skills:

- Identify the most important technological applications in the social environment.
- Organize the work and implement it in a group.

DESCRIPTION OF CONTENTS

1. See Spanish version of the course guide

2.

3.

4.

5.

6.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Development of group work	15,00	0
Study and independent work	15,00	0
Readings supplementary material	15,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	15,00	0
TOTAL	150,00	

TEACHING METHODOLOGY

The training activities are conducted in accordance with the following distribution: 40% of the hours of ECTS credits (1 credit is 25 hours) will go to the following sessions:

- Theory: The lectures will develop the issues by providing a global and inclusive vision, analyzing in detail the key issues and more complex, encouraging at all times, participation / student.
- Practical activities: Complement the theoretical activities in order to apply the basics and expand the knowledge and experience to be acquired in the course of the work proposed. They include the following types of classroom activities:
 - Classes of problems and issues in the classroom: or discussion sessions and problem-solving exercises and previously worked by students or Labs or oral presentations or tutorials scheduled (individualized or group)
 - Evaluation: Making individual evaluation questionnaires in the classroom with the presence of teachers.60% of the hours of ECTS (25 hours per ECTS) will be devoted to the following non-contact activities:
 - Work in small groups. Realisation, by small groups of students (2-4) of work, issues, problems outside the classroom. This work complements the work and encourages individual ability to integrate into working groups.
 - Work student (independent). Realization (outside the classroom) of monographs, literature search directed, issues and problems as well as the preparation of classes and exams (study). This is done individually and tries to promote self-employment. It will use the platform of e-learning (virtual classroom) of the University of Valencia in support of communication with students. Through it you will have access to course materials used in class as well as solve problems and exercises.



If it is required by the sanitary situation, the Academic Committee of the Degree will approve the Teaching Model of the Degree and its adaption to each subject, establishing the specific conditions in which it will be developed, taking into account the actual enrolment data and the space availability.

EVALUATION

Version not available in English. Please, see Spanish version.

REFERENCES

Basic

- Apuntes de la asignatura
- Stallings, William. DATA AND COMPUTER COMMUNICATIONS, 10th Edition. Pearson
- Kurose, James F. & Ross, Keith W. Redes de Computadores: Un enfoque descendente, 7ª Ed. (2017) Pearson
- Tanenbaum, Andrew S.: Redes de Computadoras, 5ª Ed., Pearson

Additional

- Tanenbaum, Andrew S.: Redes de Computadoras, 5ª Ed., Prentice-Hall
- Stallings, William: Comunicaciones y Redes de Computadores, Prentice-Hall
- Kurose, James F. & Ross, Keith: Redes de Computadores, Prentice Hall