COURSE DATA

DATA SUBJECT

Code: 34847
Name: Fundamentals of computer networks
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1407 - Degree in Multimedia Engineering	Escola Tècnica Superior d'Enginyeria	2	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1407 - Degree in Multimedia Engineering	Redes Multimedia	COMPULSORY

COORDINATION

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SUMMARY

The course Fundamentals of Computer Networks is framed within a subject group of networks. This is the subject more basic focusing on network fundamentals needed to subsequent courses that explore the network architecture and network planning. In particular, Fundamentals of Computer Networks and Multimedia Networks form a subject of 12 credits with the name of Multimedia Networks.

The course of 6 credits will correspond to the 2 nd semester of the 2 nd year.

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

The overall objectives are to cover in detail the following contents: interconnection models of computers, infrastructure physical network; layer data link layer, medium access layer; network layer, transport protocols.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

Being a second-year course, it is assumed that students already have basic knowledge in the field of engineering and have developed skills to solve problems. Also it is advisable that students have learned teamwork dynamics and skills.
More specifically, it is advisable that students have knowledge of binary and hexadecimal encoding, binary arithmetic and fundamentals of electronic circuits.

COMPETENCES / LEARNING OUTCOMES

1407 - Degree in Multimedia Engineering

I6 - Know and apply the features, functionalities and structure of distributed systems, computer networks and Internet and be able to design and implement applications based on them.

MM24 - Be able to design, develop, evaluate and ensure the accessibility, ergonomics, usability and security of multimedia systems, services and applications and of the information that these manage.

MM3 - Be able to implement methodologies, technologies, processes and tools for the professional development of multimedia products in a real context of use by applying the appropriate solutions for each environment.

MM4 - Know communication theories and their application to multimedia systems.

DESCRIPTION OF CONTENTS

- Interconnection networking models:
Introduction
OSI, TCP / IP and hybrid models
Definition of protocol and PDU
Basic examples: MAC address, protocol ARP, IP, mask and gateway

- Distributed systems
Services and architectures
Classification of networks by topology, scope and technology
Cast and addressing methods

1. Introduction

- Interconnection networking models:
Introduction
OSI, TCP / IP and hybrid models
Definition of protocol and PDU
Basic examples: MAC address, protocol ARP, IP, mask and gateway

Face No face
Theory 6 9
Problems 2 3

2. Physical network modelling

- Physical infrastructure of the network:
Introduction
Transmission media. Classification and categories
Characterization of the media. Attenuation. Crosstalk. Band width
Structured Cabling Standards

- Media Access Layer:
Introduction
Philosophy of shared access
CSMA algorithms: CSMA / CD, CSMA / CA
IEEE 802.3, 802.11
Switches. Operation.
Spanning Tree Algorithm and Link Aggregation
The concept of VLANs
Trunk interfaces (IEEE 802.1q)

- Layer Data link layer:
Introduction
Frame Definition
Overview of link layer protocols
PPP and HDLC

Face No face
Theory 14 21
Problems 4 6

- Network Layer
Introduction
IP protocol. Headers. IPv4, IPv6
Public and private IP addressing
NAT: port and process concepts, static, dynamic
VLSM and summarization technique

3. Logic network modeling

- Network Layer
Introduction
IP protocol. Headers. IPv4, IPv6
Operation of the router. Routing tables
Routing algorithms: distance vector and link state
Routing protocols internally and externally
Control Protocols

Face No face
Theory 10 15
Problems 4 6

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Laboratory	20,00
Classroom practices	10,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	15,00
Independent study and work	30,00
Preparation of lessons	30,00
Preparation for assessment activities	15,00
Resolution of case studies	0,00
Total hours	**90,00**

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:

- Activities theory.

Description: 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.

Description: Complementing 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 classroom discussion sessions and problem-solving exercises and previously worked by students laboratory practice oral presentations, conferences, tutorials scheduled (individualized or group)

- Evaluation.

Description: Implementation of 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 groups.

Description: Realization, by groups of students of work, issues, and/or problems outside the classroom. This work complements the work and encourages individual ability to integrate into working groups.

- Working staff / student.

Description: Realization (outside the classroom) of 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.

The platform of e-learning (virtual classroom) of the University of Valencia will be used 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.

EVALUATION

The course will be assessed as follows:

1) Theoretical Component (50%)

- Final written examination (50%) - EXTEO

2) Laboratory Component (40%)

- Attendance, preparation, and execution of the laboratory practice, assessed during the session (20%) - LABS

- Laboratory sessions are compulsory and cannot be retaken. Failure to justify absence from any laboratory session will result in a grade of 0 for that session.

- Failure to attend three or more laboratory sessions will result in automatic failure of the LABS component, regardless of whether the absences are justified. In such cases, the final laboratory grade will be calculated based only on the sessions attended, assigning a grade of 0 for the sessions missed. The final laboratory mark may in no case exceed 4 out of 10.

- Multiple-choice and/or short-answer questions on the final exam related to the laboratory content (20%) - EXLAB

3) Submission and presentation of assignments and/or exercises proposed by the instructor (10%)

Assessment will be carried out through the following methods:

- Objective tests, consisting of one or more examinations including short-answer questions, multiple-choice

questions, and/or theoretical and practical problem-solving.

- Preparation of reports/papers and/or oral presentations.

- Continuous assessment of each student, based on their participation and level of engagement in the teaching-learning process, taking into account regular attendance to scheduled face-to-face activities and the completion of proposed tasks and problems.

In both the first and second examination periods, in order to calculate the overall average, students must obtain a minimum mark of 5 out of 10 in both EXTEO and EXLAB.

If the course is not passed during the first examination period, students will be allowed to retain the marks of those components in which they obtained the minimum required score for the second examination period.

Any clear case of copying or plagiarism in any assessed activity will result in automatic failure of the course, and the student will be subject to disciplinary procedures as outlined in the Protocol for Acting in Cases of Academic Fraud at the Universitat de València (ACGUV 123/2020).

In all cases, the assessment of the course will adhere to the Regulations on Assessment and Grading at the Universitat de València for Undergraduate and Master's Degrees, approved by the Governing Council on 30 May 2017 (ACGUV 108/2017).

REFERENCES

Apuntes de la asignatura

Comunicaciones y redes de computadores, 7ª edición, William Stallings, Ed. Pearson, 2004

https://trobes.uv.es/permalink/34CVA_UV/um6gse/alma991004673889706258

Redes de computadoras, 5ª edición, Andrew S. Tanenbaum, Ed. Pearson, 2012

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Redes de computadoras: un enfoque descendente, 5ª edición, James F. Kurose, Keith W. Ross, Ed. Pearson, 2010

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