COURSE DATA

Data Subject	
Code	34847
Name	Fundamentals of computer networks
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1407 - Degree in Multimedia Engineering	School of Engineering	2	Second term

Subject-matter

Degree	Subject-matter	Character
1407 - Degree in Multimedia Engineering	13 - Redes Multimedia	Obligatory

Coordination

Name	Department
MICO ENGUIDANOS, FRANCISCO MIGUEL	240 - Computer Science

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 expected that students have learned teamwork dynamics and skills.
More specifically, it is expected that students have knowledge of binary and hexadecimal encoding, binary arithmetic and fundamentals of electronic circuits.

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

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.
- 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.
- 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.

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

The student should acquire the following skills:

- Identify the most important technological applications in the social environment.

- Organize the work and put into practice in a group of people.

The student should be able to:

- 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.

DESCRIPTION OF CONTENTS

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

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

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

3. Logic network modeling

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

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:

- 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 evaluated as follows:

1) Theoretical (60%)

- Final written exam (60%) - FINAL

2) Laboratory (30%)

- Attendance, preparation and conduct of the practice being evaluated in the same laboratory (15%)

- Laboratory practices will be mandatory and not retrievable.

- Choice and/or short questions made on the final exam (15%) – TEST LAB

3) Creation and presentation of work and exercises proposed by the teacher (10%)

with the following methods:

- Objective test, consisting of one or more tests that consist of isuues and/or tests and/or problems (theoretical and practical).

- Assessment of practical activities from the preparation of papers/reports and/or oral presentations.

- Continuous assessment of each student based on participation and involvement of the students in the teaching-learning process, taking into account regular attendance provided onsite activities and resolution of issues and problems raised to solve.

In first and second exam official announcements, it is required to obtain marks equal or greater than 5 in FINAL and TEST LAB. In case of fail, it will be possible to save marks of those parts that pass the minimum score for the second exam official announcement.

In any case, the evaluation of this subject will be done in compliance with the University Regulations in this regard, approved by the Governing Council on 30th May 2017 (ACGUV 108/2017).

REFERENCES

Basic

- Apuntes de la asignatura

Additional

- Tanenbaum, Andrew S.: Redes de Computadoras 5ED, Prentice-Hall. (http://trobes.uv.es/record=b2621699*val)
- Stallings, William: Comunicaciones y Redes de Computadores 7ED, Prentice-Hall. (http://trobes.uv.es/record=b2355079*val)
- Kurose, James F.: Redes de computadoras: un enfoque descendente 5ED, Pearson Educación (http://trobes.uv.es/record=b1982646*val)