COURSE DATA

Data Subject	
Code	34884
Name	Fundamentals of computer networks
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1403 - Degree in Telematics Engineering	School of Engineering	1	Second term

Subject-matter

Degree	Subject-matter	Character
1403 - Degree in Telematics Engineering	10 - Networks	Obligatory

Coordination

Name	Department
SORIANO ASENSI, ANTONIO	240 - Computer Science

SUMMARY

The course Fundamentals of Computer Networks is framed within a subject group of networks. This is the most basic course focusing on network fundamentals necessary for subsequent courses that delve into network architecture and network planning. The course is assigned 6 ECTS.

The course has been designed with a methodology adapted to the European Higher Education Area (EHEA), and aims to focus the student learning. This method improves student involvement and supports its assessment on an ongoing basis, reinforcing and complementing the knowledge acquired in masterclasses.

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

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, from the matter Computing.

OUTCOMES

1403 - Degree in Telematics Engineering

- G3 - Acquisition of the knowledge of the basic and technological subjects that allows students to learn new methods and theories and endows them with the versatility to adapt to new situations.
- G4 - Ability to solve problems with initiative, decision-making and creativity, and to communicate and transmit knowledge, abilities and skills, understanding the ethical and professional responsibility of the activity of a telecommunications technical engineer.
- G5 - Knowledge to carry out measurements, calculations, assessments, evaluations, loss adjustments, studies, reports, task planning, and other analogous work in the specific field of telecommunications.
- G6 - Ability in the handling of specifications, regulations and norms of compulsory compliance.
- R6 - Ability to conceive, deploy, organize and manage telecommunications networks, systems, services and infrastructures in residential (home, urban and digital communities), business and institutional contexts, as well as understanding their economic and social impact.
- R12 - Understand and use the concepts of network architecture, protocols and communications interfaces.
- R13 - Ability to differentiate the concepts of access and transport networks, circuit and packet switching networks, fixed and mobile networks, as well as distributed network systems and applications, voice, data, audio, video, interactive and multimedia services.
- R14 - Understand the interconnection and routing methods of network, as well as the fundamentals of planning, sizing networks according to traffic parameters.

LEARNING OUTCOMES

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. (R-6, R-12, R-13, R-14)

- 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. (R-12, R-13, R-14)

- Ability to specify rules to write a specification for the deployment of a network. (R-6, R-12, R-13)

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

Face / No face
Theory 6 / 3
Problems 3 / 1,5

2. Physical network modeling

- Physical infrastructure of the network:
Introduction
Transmission media. Classification and categories
Characterization of the media. Attenuation. Crosstalk. Bandwidth
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
Error control: checksum and CRC
PPP and HDLC

Face / No face
Theory 10 / 21
Problems 3 / 7,5

3. Logical network modeling

- Network Layer
Introduction
IP protocol. Headers. IPv4, IPv6
IP addressing
VLSM and summarization technique
Operation of the router. Routing tables
Fragmentation
Routing algorithms: distance vector and link state
Routing protocols internally and externally

- Transport Layer
Introduction
Port concept, process
Basics of TCP and UDP
Concept of NAT: static, dynamic and extended

Face / No face
Theory 14 / 21
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
Development of individual work	3,00	0
Study and independent work	12,00	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	14,00	0
Preparing lectures	15,00	0
Preparation of practical classes and problem	15,00	0
Resolution of online questionnaires	6,00	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. (G-3, G-4, R-6, R-12, R-13, R-14)

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. (G-5, G-6, R-6, R-12, R-13, R-14)

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. (G-3, G-4, G-5, G-6, R-6, R-12, R-13, R-14)

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 small groups. (G-3, G-4, G-5, G-6, R-6, R-12, R-13, R-14)

Description: Realization, 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.

- Working staff / student. (G-3, G-4, G-5, G-6, R-6, R-12, R-13, R-14)

Description: 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.

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.

Also, we will use the platform from Cisco Systems to follow tne certification with similar content to this course.

EVALUATION

The course will be evaluated as follows, in Continous Evaluation:

1) Theoretical (60%)

- Final written exam (35%, FINAL)

- Realization of on-line questionnaires through the semester (15%)

- Short duration test (10%, PARTIAL)

2) Laboratory (30%)

- Attendance, preparation (brief summary, notes, etc) and conduct of the practice being evaluated in the same laboratory (10%)

- Practical skills assessment done in laboratory (10%)

- Test and/or short questions made on the final exam (10%, EXAM-LAB)

- If the EXAM-LAB mark is higher than its average with the attendance to laboratory sessions, the attendance to laboratory mark will be that achieved in EXAM-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 both theoretical and practical issues as problems.

- 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.

The fulfillment of all these requirements is required in order to pass the course:

- Average mark equal or higher than 5.

- FINAL exam must be graded at least with 4.

- EXAM-LAB must be graded at least with 3.

In case you fail on first call, the grades can be saved till second call, except in the case you take again the corresponding test. On second call, both the FINAL and PARTIAL are evaluated together with a total weight of 45%. On second call, it will still be necessary to fulfill the same minimum and average grade requirements as on first call.

Homeworks are compulsory. In case they have been done in a group, all the members should appear in the report submitted in “aulavirtual” or in paper if it was the case. Unless otherwise stated, all documents submitted in aulavirtual will be in pdf format.

REFERENCES

Basic

- Apuntes de la asignatura en Aula Virtual

Additional

- - Tanenbaum, Andrew S.: Redes de Computadoras, Prentice-Hall (http://links.uv.es/W08reCv)

  - Stallings, William: Comunicaciones y Redes de Computadores, Prentice-Hall (http://links.uv.es/IPF7tQ0)

  - Kurose, James F.: Redes de Computadores, Prentice Hall (http://links.uv.es/4ymnQw6)