COURSE DATA

Data Subject	
Code	34678
Name	Fundamentals of Computer Networks
Cycle	Grade
ECTS Credits	6.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
1400 - Degree in Computer Engineering	School of Engineering	2	First term

Subject-matter

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

Coordination

Name	Department
GARCIA PINEDA, MIGUEL	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 planning networks.

The course of 6 credits will correspond to the 1 st 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, from the matter Computing.

OUTCOMES

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.
- 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.
- 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.
- TI2 - Ability to select, design, implement, integrate, evaluate, build, manage, exploit and maintain hardware, software and network technologies, within adequate cost and quality thresholds.
- TI4 - Ability to select, design, implement, integrate and manage communication networks and infrastructures in an organisation.

- SI3 - Ability to actively participate in the specification, design, implementation and maintenance of information and communication systems.

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.

- 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

Face No face
Theory 2 3
Problems 1 1,5

2. Physical network modeling

- 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
Study checksum and CRC
PPP and HDLC

Face No face
Theory 14 21
Problems 5 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
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). Laboratory practices will be mandatory and not retrievable.

- 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 small groups.

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.

Description: Realization (outside the classroom) of monographs, literature search directed, issues and problems as well as the preparation of classes and exams (study). In this task, the Cisco Systems teaching platform will be used, where students will be able to access the content of the subject online. The students will be able to obtain an official certification in the case of completing the work proposed by the teachers using this platform. 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.

In addition, the Cisco Systems teaching platform will also be used so that students can take the certification with contents very similar to those seen in the course.

EVALUATION

The course will be evaluated as follows:

1) Theoretical part and problems (60%)
- Continual assessment oriented with the Cisco certification (20%) - CONT
- Final Exam (25%) - FINAL
- Short term intermediate exam (15%) - PARCIAL

2) Laboratory part (30%)
- Assistance, preparation and performance of the evaluated practice in the same laboratory (15%)
- Test and/or short questions as well as practical questions (15%): 5% individual practical evaluation and 10% by means of a final test (EXAM-LAB)

3) Preparation 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 to solve.

In first exam official announcement, in order to take the average, it is necessary to obtain a minimum mark of 4 in each of the parts of the CONT and FINAL exams, and 3 in the EXAM-LAB. If the subject is not passed in the first call, the grades of those parts that have passed the minimum grade could be saved for the second call. In the event of having to repeat FINAL in the 2nd call, FINAL and PARTIAL (even if the latter is passed) will be replaced by a single exam with a weight of 40% on the final mark and in

which a minimum mark of 4 must be obtained in each of the parts in order to be able to take the average. In the second call, in EXAM-LAB it will still be necessary to obtain a minimum score of 3 to be able to take the average and may recover those parts of CONT that have not reached the minimum mark of 4 in the 1st call.

The attendance, preparation and performance of the evaluated practice in the same laboratory (15%) and the performance and presentation of works and exercises proposed by the teaching staff (10%) cannot be recovered in the second call.

REFERENCES

Basic

- Apuntes de la asignatura en Aula Virtual
- CCNA routing and switching : complete review guide / Todd Lammle. Indianapolis, Indiana : Sybex, 2017

Additional

- Tanenbaum, Andrew S.: Redes de Computadoras, Prentice-Hall
- Stallings, William: Comunicaciones y Redes de Computadores, Prentice-Hall
- Kurose, James F.: Redes de Computadores, Prentice Hall

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

The teaching method for this subject will follow the teaching model approved by the Academic Committee of the GII / GIM degrees (https://go.uv.es/catinfmult/ModeloDocenciaGIIGIM). If facilities are closed because of COVID-19, lectures will be replaced by synchronous sessions that will run according to the degree timetable, using the tools provided by the university.

The weights for each activity will remain the same as specified in the teaching guide.