

30316 - Network Technologies and Internet

Información del Plan Docente

Academic Year	2018/19
Subject	30316 - Network Technologies and Internet
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	438 - Bachelor's Degree in Telecommunications Technology and Services Engineering
ECTS	9.0
Year	2
Semester	Second semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The subject program is developed through the following methodologies:

Classroom and laboratory methodology: lectures (M1), resolution of practical problems in the classroom (M8), lab practices (M9) and evaluation (M11). Additionally, students will be personally attended through tutoring sessions (M10)

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Autonomous learning: In addition to the lectures and labs, the learning activities will require autonomous learning: practical work (M13), theoretical (M14) and practical (M13) study.

4.2. Learning tasks

The activities used to reach the proposed learning outcomes are:

A01: Lectures (45 hours). This activity will take place in the classroom. Together with the individual study (A07), this activity is designed to provide to the students the theoretical basis of the subject.

A02: Resolution of practical problems (15 hours). This activity will take place in the classroom and may require previous work from the students (A07).

A03: Lab practices (24 hours). Students will do 2-hour practical sessions in the lab each week. This activity will take place in the Lab 2.03 (Telematics Lab) in Ada Byron building. The practical work will be done in small groups, configuring and analyzing different network scenarios, related to the theoretical concepts seen in the lectures. Each lab practice may consist of one or more sessions. When needed for the lab, the presentation of previous work will be required (A07). In addition, at the end of each lab, a report will have to be presented. In this practical sessions, students will learn to use tools for configuring, measuring and analyzing networks that will be required in later subjects.

A06: Tutoring sessions. Hours of personalized attention to students to review and discuss the materials and topics presented in both lectures and labs.

A08: Evaluation. Set of written tests (theoretical and practical) and presentation of reports to evaluate the student progress. Details are given in the Evaluation section.

4.3. Syllabus

Lectures contents:

Unit 0. Introduction.

Subject overview. Need of internetworking. Purpose of communication protocols: TCP/IP architecture. Transport networks evolution. Need of managing and securing networks.

Unit 1. End-to-end communications: IP-based services

Lesson 1.1. General concepts of the application layer

Lesson 1.2. Applications

Lesson 1.3. Network application programming: socket API

Unit 2. End-to-end communications: transport level

Lesson 2.1. UDP and TCP protocols

- General concepts of transport level
- UDP protocol
- TCP protocol: Connection-oriented protocol. Congestion control: TCP versions

Unit 3. Internetworking: IP level

Lesson 3.1. Internet Protocol (IPv4)

- Addressing
- IPv4 functionality: PDU and Primitives
- Fragmentation and reassembly
- Routing
- Control functions: support of additional protocols

Lesson 3.2. Next generation networks (IPv6)

- Introduction to IPv6
- Addressing
- PDU. Extension headers
- Control functions
- Autoconfiguration
- Routing

Lesson 3.3. Mobility management

- Concept of mobility on the Internet
- Limitations of the TCP/IP architecture
- Mobility requirements
- Mobility at the network level: Mobile IP. Mobile IP (version 4) - MIPv4; Mobile IP (version 6) - MIPv6

Unit 4. Internetworking: evolution of technologies

Lesson 4.1. Switched LAN.

- Overview of Ethernet.
- Switched Ethernet. Switch structure. MAC routing. Priorities. Switching at MAC level. Multicast. Virtual LANs.

Lesson 4.2. MPLS.

- MPLS. Definition. Architecture. MPLS Label. Switching. Label distribution protocols. Compatibility with FR and ATM.

Unit 5. Security and network management

Lesson 5.1. Communications security

- Security areas
- Security requirements
- Types of threats
- Security tools

Lesson 5.2. Networks management

- Network management areas

- TCP/IP management: SNMP architecture

Lab contents:

- **IP services: application protocols**

Client-server architectures

- Transport level: process identification and reliability

TCP protocol: connection-oriented protocol, sequencing, error control

- Network level: IPv4 and IPv6 protocols

Addressing and routing

Network control, fragmentation, address resolution

Measurements and analysis

- Technologies and interconnection: transport networks

Configuration and analysis of a network scenario based on switched LAN. VLAN.

4.4.Course planning and calendar

Schedule of lectures, labs and presentation of reports

The subject schedule, both lectures (60 hours) and labs (24 hours) will be defined by the center in the academic calendar of the corresponding course. The dates of the tests or other planned activities will be indicated with enough advance by the instructors.

4.5.Bibliography and recommended resources

Basic Bibliography:

BB Kurose, James F.. Computer networking : A top-down approach featuring the internet/ James F. Kurose, Keith W. Ross . - 7th ed. Boston : Pearson, cop. 2017

BB Comer, Douglas E.. Internetworking with TCP/IP. v.1, Principles, protocols, and architecture / Douglas E. Comer . - 4th ed Upper Saddle River, New Jersey : Prentice Hall, cop. 2000

Further reading:

BC Stevens, W. Richard. TCP/IP illustrated. Vol. 1, The protocols / W. Richard Stevens . - [20th. print.] Reading, Massachusetts [etc.] : Addison-Wesley, 2001

URLs:

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IETF Request For Comments (RFC): documentos de especificaciones (varios) - [<http://www.ietf.org/rfc.html>]