

30239 - Network Design and Administration

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura 326 - Escuela Universitaria Politécnica de Teruel
Degree	439 - Bachelor's Degree in Informatics Engineering 443 - Bachelor's Degree in Informatics Engineering
ECTS	6.0
Year	4
Semester	Half-yearly
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

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

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The learning process is based on the following activities:

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Classroom activities

Activity Type 1 (lectures) 20 hours
Activity Type 2 (class of problems) 10 hours
Activity Type 3 (lab sessions) 30 hours
Activity Type 6 (practical work) 08 hours

Non-presential activities

Activity type 7 78 hours (personal study)

Final evaluation Activity

Activity Type 8 (written test) 04 hours

5.2.Learning tasks

The program offered in order to achieve the expected results includes the following activities:

Activity Type 1 (lectures): 20 hours
Activity Type 2 (class of problems): 10 hours

A total of 30 hours of theoretical sessions, problems and case studies are presented in the classroom.

Activity Type 3 (lab sessions): 30 hours
15 laboratory class sessions, aimed at the development of techniques and procedures seen in theoretical and problem sessions.
Activity Type 6 (practical work): 8 hours
During the course practical work is developed, in which apply the concepts and skills acquired in the subject, especially network management concepts, under lecturer supervision.

5.3.Syllabus

The contents of lectures and problems are organized into the following parts:

Introduction.

Overview of design and network management.

1. Interconnection IPv4 networks.

Review of the IPv4 protocol.
NAT: Network Address Translation.
Routing protocols. RIP and OSPF.
Control functions. Support for other protocols.
Management of TCP / IP networks: SNMP architecture.
Problems.

2. Interconnection IPv6 networks.

Introduction to IPv6.
Coexistence and transition of IPv4-IPv6.

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Addressing.
PDU: Extension Headers.
Autoconfiguration.
Control functions.
Routing.

3. Building networks using switched Ethernet technology.

Ethernet review.
Switched Ethernet. Switch's structure. MAC routing. MAC switching. Multicast. virtual LAN.
Problems.

4. Wireless access technologies.

Special features of wireless access. Impact of mobility (fixed access vs. mobile access).
General characteristics. Standards. Functional architecture of the access network and network topologies. Medium access mechanisms. IP technology in the access network.
Wireless local area networks (WLAN). IEEE 802.11 networks. Other wireless access networks.

5. Wired access technologies.

The most relevant features of the different physical media used in access networks today.
General characteristics. Functional architecture of the access network and network topologies. User equipment and network. Medium access mechanisms. IP technology in the access network.
Access networks copper pair (xDSL.) Hybrid networks and fiber cable (HFC). Other wired access networks.

The lab sessions are organized as follows:

1.1 Configuring an IPv4 scenario.

The aim of this lab sessions are the design and management of a network in a scenario that consists of an IPv4 router and terminal equipment. In this practice are used the following knowledge: IPv4 addressing and routing. The performance of this scenario will be analyzed by means of studied verification tools, detecting possible configuration errors and predicting results.

1.2 Configuring an IPv4-NAT scenario.

The aim of this lab session is the configuration of Internet access from a private subnet (IPv4), identifying limitations of the basic NAT and implementing appropriate solutions.

2. Configuring an IPv6 scenario.

The aim of this lab sessions are the configuration of a networking scenario using the IPv6 protocol ensuring both internal and external connectivity and interoperability with IPv4 protocol. To do so the performance of an IPv6 scenario will be analyzed and evaluated, using all necessary verification tools, detecting possible configuration errors and predicting results.

3. Setting up a practice scenario switched Ethernet.

The practical proposal involves the design and management of a scenario aimed at interconnecting IP networks using switched LAN technologies. On this scenario it is put into practice the theoretical knowledge acquired: Switching and Virtual LAN MAC.

4. Setting up a practice scenario WIFI.

The practical proposal involves the design and management of a scenario aimed at interconnecting IP networks using WiFi technology. On this scenario it is put into practice the theoretical knowledge acquired: Rate of Access Points, Access, etc.

The proposed type 6 activities (practical work):

Activity A: Configuring and Managing network servers.

It must be configured DHCP and NTP server for the internal network machines. It should be checked that the network equipment takes the IP address automatically and simultaneously synchronizes its clock with the server. It should also be observed the information exchange of relevant protocol using tools for monitoring and analysis of network traffic. In addition, a TFTP server must be configured, and the traffic generated when downloading a file will be monitored. This activity must be done without the support of the information provided in the scripts of lab sessions. It is therefore a challenge, although it seems simple, requires the active participation of students in the search for the necessary information.

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Activity B: Developing management application using SNMP.

In this activity, students should develop an application that allows by means of an user interface, assign every port to a segment of an concentration element and show a list of ports for every segment, it is compulsory using the SNMP protocol. The lecturer will provide the necessary documentation for implementation. This activity must be done by every student (individual work).

5.4.Course planning and calendar

Schedule sessions and presentation of works

The course is given for 15 weeks with the following distribution of activities:

During the 15 weeks (4 hours per week):

- Development of master classes
- Solve problems
- Development lab sessions

Program

See in the corresponding section

5.5.Bibliography and recommended resources

[BB: Bibliografía básica / BC: Bibliografía complementaria]

- Zaragoza:
- [BB] Kurose, James F.. Redes de computadoras : un enfoque descendente / James F. Kurose, Keith W. Ross ; revisión técnica Carolina Mañoso Hierro, Ángel Pérez de Madrid y Pablo ; revisión técnica para Latinoamérica Luis Marrone ... [et. al.] . - 5ª ed. Madrid : Pearson Educación, D.L. 2010
- [BB] Stevens, W. Richard. TCP/IP illustrated. Vol. 1, The protocols / W. Richard Stevens . [20th. print.] Reading, Massachusetts [etc.] : Addison-Wesley, 2001

Listado de URL

- IETF Request For Comments (RFC): documentos de especificaciones (varios) [<http://www.ietf.org/rfc.html>]
- The TCP/IP guide. [http://www.tcpipguide.com/free/t_toc.htm]
- Teruel:
- [BB] Kurose, James F.. Computer networking : a top-down approach / James F. Kurose, Keith W. Ross ; international edition contributions by Goutam Paul . 6th ed. Boston [etc.] : Pearson, 2013
- [BB] Kurose, James F.. Redes de computadores : un enfoque descendente basado en Internet / James F. Kurose, Keith W. Ross ; traducción, Manuel Barrio Solorzano ... [et. al.] . 5ª ed. Madrid : Pearson Educación, D.L. 2010
- [BB] Stevens, W. Richard. TCP/IP illustrated. Vol. 1, The protocols / W. Richard Stevens . 2nd Edition Reading, Massachusetts [etc.] : Addison-Wesley, 2012

Listado de URL

- La guía de TCP/IP [http://www.tcpipguide.com/free/t_toc.htm]