# SUBJECT TEACHING GUIDE

## G674 - Design and Management of Networks

## Degree in Computer Systems Engineering

Academic year 2022-2023

| 1. IDENTIFYING DATA | | | | | |
|---|---|---|---|---|---|
| Degree | Degree in Computer Systems Engineering | | | Type and Year | Optional. Year 4 |
| Faculty | Faculty of Sciences | | | | |
| Discipline | Subject Area: Computer Engineering<br>Mention in computer Engingeering | | | | |
| Course unit title and code | G674 - Design and Management of Networks | | | | |
| Number of ECTS credits allocated | 6 | Term | | Semester based (1) | |
| Web | https://aulavirtual.unican.es/ | | | | |
| Language of instruction | Spanish | English Friendly | Yes | Mode of delivery | Face-to-face |

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|---|---|
| Department | DPTO. INGENIERIA DE COMUNICACIONES |
| Name of lecturer | ROBERTO SANZ GIL |
| E-mail | roberto.sanz@unican.es |
| Office | Edificio Ing. de Telecomunicación Prof. José Luis García García. Planta: - 2. DESPACHO (S205) |
| Other lecturers | JOSE ANGEL IRASTORZA TEJA |

### 3.1 LEARNING OUTCOMES

- The student will become familiar with the most relevant technology, protocols, specific terminology and recommendations for international public and corporate telecommunications networks. The student will also acquire knowledge about data transmission networks while deepening on both access technologies and services that public telecommunication carriers provide. Those carriers represent support for both the more traditional services (PSTN, leased lines, etc.) and for those more innovative (public Internet, virtual private networks, IP telephony). In addition, the student will learn about the most widely used network management protocols supporting well known OAM techniques.

## 4. OBJECTIVES

The main objective of this course is that students complete their training on networks of data transmission, making a special emphasis on both access technologies (wired and wireless) and services that public telecommunications carriers offer, which represent support for both traditional services (PSTN, leased lines, etc.) and for those more innovative (public Internet, virtual private networks, IP telephony). In addition, special emphasis on network administration and management, the SNMP protocol and network management platforms is done.

## 6. COURSE ORGANIZATION

| CONTENTS | |
|---|---|
| 1 | Chapter 1. Introduction to access technologies.<br>Wired and wireless media. Network topologies. Broadcast vs point-to-point networks. Services: types and requirements. |
| 2 | Chapter 2. Wireless access technologies.<br>ISM spectrum. The 802.11 family. Standarization. TCP/IP performance over IEEE 802.11. Management tasks on IEEE 802.11. Security on IEEE 802.11. |
| 3 | Chapter 3. Cellular access networks.<br>GSM architecture. GPRS system. Evolution from 2G to 3G systems. Standarization and the 3GPP. UMTS system. Evolution to 4G: HSDPA and HSUPA. |
| 4 | Chapter 4. X.25 packet data networks.<br>Virtual Circuit (Permanent and Switched). Logical channel. Physical layer X.21. Link layer LAPB. Network layer X.25. X.3 parameters. Recommendations X.28, X.29 and X.32. |
| 5 | Chapter 5. Trunk network evolution.<br>Evolution on the logical layer: Frame Relay, ATM and IP. Evolution on the physical layer: SDH/SONET, MPLS, WDM, MetroEthernet. |
| 6 | Chapter 6. Network management on OSI systems.<br>Introduction and main concepts. Submodels of a network management architecture. Functional areas of management. Integrated and distributed management. |
| 7 | Chapter 7. Management protocols: SNMP and RMON.<br>SNMP architecture. ASN.1 syntaxis: SMIv1. Internet registry tree. MIB-II(RFC 1213). SNMPv1 message format. Protocol enhancements for SNMP v2 and v3. RMON and MIB RMON. |
| 8 | Ordinary final exam. |

## 7. ASSESSMENT METHODS AND CRITERIA

| Description | Type | Final Eval. | Reassessn | % |
|---|---|---|---|---|
| Lab assignment evaluation. | Laboratory evaluation | No | No | 30,00 |
| Individual evaluation for Part 1 | Written exam | No | Yes | 35,00 |
| Individual evaluation for Part 2 | Written exam | No | Yes | 35,00 |
| TOTAL | | | | 100,00 |

Observations

The final qualification is obtained by means of the following expression, in which TEOR is the one corresponding to the theory part of the course and PRAC corresponds to lab assignments.
NOTA = TEOR * 0.70 + PRAC * 0.30
TEOR is the arithmetical mean from the individual (per lesson) exams, in case the student has done them all, and a mark of at least 4.0 has been reached on every individual exam.
Whether the student hasn't done any individual exam, or some exam has been qualified with a mark lower than 4.0, TEOR will be the mark obtained on the ordinary final exam, as continuous evaluation is not compulsory.
The reassessment of the lab part (PRAC) will be carried out via a final lab exam.

Observations for part-time students

The final qualification is obtained by means of the following expression, in which TEOR is the one corresponding to the theory part of the course and PRAC corresponds to lab assignments.
NOTA = TEOR * 0.70 + PRAC * 0.30
TEOR is the arithmetical mean from the individual (per lesson) exams, in case the student has done them all, and a mark of at least 4.0 has been reached on every individual exam.
Whether the student hasn't done any individual exam, or some exam has been qualified with a mark lower than 4.0, TEOR will be the mark obtained on the ordinary final exam, as continuous evaluation is not compulsory.
The reassessment of the lab part (PRAC) will be carried out via a final lab exam.
For part-time students, flexible lab schedule will be negotiated.

## 8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

TANENBAUM, Andrew S., “Computer networks”, 4ª edición, Upper Saddle River, Pearson Education International, 2003.
SNMP, SNMPv2 and RMON: Practical network managemet, second edition by Stallings William; hardcover 478 pages, published by Addison Wesley, 07/96, ISBN: 02011634791