

## SUBJECT TEACHING GUIDE

M1610 - Design and operation of telematic networks

Master's Degree in Telecommunication Engineering

Academic year 2021-2022

| 1. IDENTIFYING DATA              |   |                  |                    |                  |                    |
|----------------------------------|---|------------------|--------------------|------------------|--------------------|
| Degree                           | Master's Degree in Telecommunication Engineering                    |                  |                    | Type and Year    | Compulsory. Year 1 |
| Faculty                          | School of Industrial Engineering and Telecommunications             |                  |                    |                  |                    |
| Discipline                       |   |                  |                    |                  |                    |
| Course unit title and code       | M1610 - Design and operation of telematic networks                  |                  |                    |                  |                    |
| Number of ECTS credits allocated | 5   | Term             | Semester based (1) |                  |                    |
| Web                              | <a href="http://www.timat.unican.es">http://www.timat.unican.es</a> |                  |                    |                  |                    |
| Language of instruction          | Spanish   | English Friendly | Yes                | Mode of delivery | Face-to-face       |

|                  |  |
|------------------|--|
| Department       | DPTO. INGENIERIA DE COMUNICACIONES   |
| Name of lecturer | LUIS FRANCISCO DIEZ FERNANDEZ  |
| E-mail           | <a href="mailto:luisfrancisco.diez@unican.es">luisfrancisco.diez@unican.es</a>                                       |
| Office           | Edificio Ing. de Telecomunicación Prof. José Luis García García. Planta: - 2. DESPACHO CONTRATADOS TELEMATICA (S226) |
| Other lecturers  | RAMON AGÜERO CALVO   |

| 3.1 LEARNING OUTCOMES   |
|---|
| - Understand the performance assessment of channel access techniques.   |
| - Understand multiple access schemes and solutions, their application for mobile communications, and their performance evaluation |
| - Carry out the analysis of various techniques, algorithms and protocols for both the network and transport layers                |
| - Use software tools to carry out the analysis of the aforementioned techniques   |

#### 4. OBJECTIVES

The main goal of this course is acquiring the capacity of analyze, on a critical and objective way, the performance and behaviour of various techniques, algorithms and protocols for communication systems.

In particular, special attention will be paid to channel access methods (local area networks) and multiple access techniques (mobile communication networks)

Different solutions at both network (routing) and transport levels will be studied as well.

#### 6. COURSE ORGANIZATION

##### CONTENTS

|   |   |
|---|---|
| 1 | Part 1 - Analysis of channel access techniques. Aloha Protocols. CSMA Protocols. CSMA/CD and CSMA/CA.   |
| 2 | Part 2 - Analysis of multiple Access techniques. Introduction. Legacy solutions: FDMA and TDMA. CDMA multiple access. LTE (OFDMA)                                   |
| 3 | Part 3 - Network layer algorithms and protocols. Routing and buffer management. Software Defined Networking (SDN) and OpenFlow. Information Centric Networking      |
| 4 | Part 4 - Analysis of transport layer techniques and protocols: TCP. Congestion control. Legacy TCP. Evolution of TCP congestion control. TCP performance assessment |

#### 7. ASSESSMENT METHODS AND CRITERIA

| Description        | Type         | Final Eval. | Reassessn | %      |
|--------------------|--------------|-------------|-----------|--------|
| Parts 1 and 2 Exam | Written exam | No          | Yes       | 35,00  |
| Parts 3 and 4 Exam | Written exam | No          | Yes       | 35,00  |
| Lab assignments    | Work         | Yes         | No        | 30,00  |
| TOTAL              |              |             |           | 100,00 |

##### Observations

The final course qualification is based on two parts: theory (TEOR) and lab assignments (PRAC).

- The theory part is the average of the two exams (one for Parts 1 and 2 and another one for Parts 3 and 4)

- Lab assignments are marked based on the deliverables that the students would need to prepare (groups of 3/4 people). This is compulsory and a requirement to pass the course.

The final qualification (EF) will be  $EF = 0.7 \cdot TEOR + 0.3 \cdot PRA$

In any case, the qualification for each of the two theory parts must be higher than 4; otherwise the final course qualification would be the one corresponding to it. The lab qualification is kept until the September extraordinary exam.

##### Observations for part-time students

The two intermediate exams are optional; if a student did not want to take them, the qualification corresponding to the theory would be that of the final ordinary exam.

#### 8. BIBLIOGRAPHY AND TEACHING MATERIALS

##### BASIC

A. Tanenbaum, D. Wetherall, "Computer Networks". Fifth Edition. Pearson

T. Rappaport. "Wireless Communications: Principles and Practice". Second Edition. Prentice Hall

