

Academic Year: ( 2023 / 2024 )

Review date: 30-03-2023

Department assigned to the subject: Telematic Engineering Department

Coordinating teacher: GARCIA MARTINEZ, ALBERTO

Type: Electives ECTS Credits : 3.0

Year : Semester :

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

Communications Networks and Services

**OBJECTIVES**

The aim of this course is to introduce the student to the Internet network as a complex system composed of a large number of interconnected networks, administered in an independent fashion by people seeking to accomplish diverse objectives. In this scenario, the ability to route efficiently, flexibly and in a scalable way is of uttermost importance, and technologies differ notably from those presented to the student in previous courses. In addition, business considerations play a key role in the Internet, since the way networks can obtain economic benefit determines how the routing technology is designed and deployed.

In the labor future, the student will work for an organization which will depend on the quality of the Internet connection, either as traffic sink, as traffic source, or as a connectivity provider between networks or users. In this case, the student will benefit from knowing how the Internet works and which configurations are required to fulfill specified objectives.

To complete these objectives, the student must acquire the following knowledge:

- Understand the organizational model of the Internet. Understand the business model for transporting data over the Internet, and the impact in the technical decisions. Understand how competency among providers results in an appropriate solution for services provided by a large number of agents.
- Understand the routing protocol among networks, BGP (Border Gateway Protocol), which is the technology used to solve interdomain routing.

Regarding to the general abilities, in this course we will work on:

- An overview of the complex problem of traffic transportation, in particular, integrating business and technical considerations
- A critic attitude about current and developing technologies
- The ability to configure communication equipment (routers) to comply with defined objectives

In relation with the Program Outcomes specified for the degree, this course aims to cover:

- "a) an ability to apply knowledge of mathematics, statistics, science, telecommunication technologies and engineering
- c) an ability to design a system, component, or process to meet identified needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- e) an ability to identify, formulate, and solve engineering problems
- h) the broad education necessary to understand the impact of tele-communication solutions in a global, economic, environmental, and societal context
- j) a knowledge of contemporary issues
- k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice"

**DESCRIPTION OF CONTENTS: PROGRAMME**

- Introduction to interdomain routing. The BGP routing protocol.
- Business model of the Internet. Possible relationships among communication networks
- BGP route processing. BGP attributes. Route selection rules
- Configuring BGP routers
- Traffic engineering for interdomain routing
- Analysis of the current Internet: roles and strategies of Internet networks

## LEARNING ACTIVITIES AND METHODOLOGY

Learning activities are organized as follows:

- (1) Students receive teaching materials and manage basic reference texts to allow them to complete their knowledge in the topics in which they are most interested.
- (2) In classes the knowledge the students must acquire is debated, and some exercises are solved to consolidate it.
- (3) Students solve exercises, being some of them evaluated, so that they can obtain feedback about the knowledge acquired.
- (4) Students perform laboratory practices in a virtual environment that allows modelling several routers, both as a personal task and during the class schedule
- (5) Students can ask the teacher individually to solve the questions raised during their learning process.

## ASSESSMENT SYSTEM

Evaluation:

Ordinary period:

- 2 partial exams, performed during the lecturing hours of the course. The value of the first exam is 2.5, and the second 3.5 points.
- Evaluation of the practical work, with a total value of 2.5 of the final grade. Practices done out of the class scheduling will be performed individually, and have a total value of 0.1. Practices performed in class hours will be done in pairs and have a value of 2.4.
- Theory exam, done in the date reserved for the ordinary exam, with a value of 5 points (of the global qualifications, which are evaluated over 10 points). There is no minimum qualification required for this exam.

Note that the sum of these parts can reach 11 points. The final qualification is obtained as  $\max \{10, \text{sum}(\text{student's qualifications})\}$

Extraordinary period:

- The student will perform an exam comprising theory and problems, which is evaluated over 5 points.

The qualification is obtained as:

$\text{Max} \{10,$

$\text{Sum} (\text{partial exam 1} + \text{partial exam 2}) * 5 / 5.5 + \text{extraordinary period exam},$   
 $\text{extraordinary period exam} * 2 \}$

Note that the student can obtain the 100% of the qualification with the exam made for the extraordinary period.

<b>% end-of-term-examination:</b>	<b>25</b>
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	<b>75</b>