Universidad Zaragoza

Year : 2019/20

30350 - Data Transport Networks

Syllabus Information

Academic Year: 2019/20
Subject: 30350 - Data Transport Networks
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 438 - Bachelor's Degree in Telecomunications Technology and Services Engineering
ECTS: 6.0
Year: 3
Semester: First 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 learning process for this subject is as follows:

The subject is presented with a strong practical approach and using Problems-based Learning (PBL): considering the existing problems, seeking solutions and fostering critical thinking and self-evaluation of results. The teaching-learning methodologies to be undertaken to achieve the proposed learning results are as follows:

M1: Participative lectures. Presentation by the teacher of the main contents of the subject, combined with the active participation of students. This activity will take place present in the classroom. This methodology, supported by the individual study of the student (M14), is designed to provide students with the theoretical foundations of the subject content.

M8: Classroom practices. Problems solving and practical cases proposed by the teacher, with the possibility of exposing them by students individually or in groups authorized by the teacher. This activity will take place in person in the classroom, and may require preparatory work by students (M13).

M9: Laboratory practices. The students will develop several practice sessions of 2 hours. This activity will take place in person at the Laboratory 2.03 (Telematics Laboratory - Ada Byron Building). The work will be carried out both individually and in small groups to enhance the applied aspects of design, sizing and planning of transport networks and their traffic management and congestion control: with creative exercises of different complexity, related to the theoretical concepts seen during lectures.

M10: Tutoring. Schedule for student services, both individually and in groups and in any case personalized with the aim of reviewing and discussing the materials and topics presented in both theoretical and practical classes.

M11: Evaluation. Set of oral and written, theoretical-practical and reporting practices or work used in the evaluation of student progress. The detail is in the corresponding section of the Evaluation.

4.2.Learning tasks

The program that the student is offered to help you achieve the expected results includes the following activities

Theoretical sessions, presented in the classroom, whose main contents are organized in the following thematic units:

- Unit 1. Introduction. Technological, legal and economic context. Overview of transport networks: current technologies and emerging trends. Technical concepts (network segmentation, traffic aggregation, hierarchical groupings, architectures and network structures, protocols and services, virtual private networks). Legal and institutional framework. Trends. Business Models.
- Unit 2. Transport technologies. PDH (Synchronization. Multiplexing. Technical Concepts. Hierarchical group. Frame format. Topology. Settings links. Planning Network. Problematic multi-stage networks. Clos Condition. Lee Method. Graph Theory). SDH (PDH to SDH Evolution. Technical Concepts. Frame format. Pointers. Hierarchical group. Multiplexing structure. Topology. Next Generation NG-SDH). WDM (Technical concepts. Optical Transmission. Optical channels. Topology. Configuring. Migration to WDM. Switching. Routing. Global Network structure. Trends. Optical Network E2E. Optical Switching).
- Unit 3. Protocols and services. X25, Frame Relay and ATM (Evolution from X.25 and FR to ATM. Definitions and comparative. Virtual circuits. Switching. Routing. Architecture protocols. Frame format. Traffic management. Congestion control). Ethernet and Gigabit Ethernet (Introduction. Interconnection elements. Hub, switch, router. Throughput. Switching techniques. GbEthernet. Networks Integration. Converging trends). VLAN and IP (Definition and functional structure. Architecture protocols. Trends. Practical examples. FI-Ware project). MPLS (Introduction. Comparison vs ATM. MPLS. Routing. Switching). VPN (Introduction. IPSec (tunneling). VPN networks. MPLS networks. NGN networks).
- Unit 4. Challenges and trends. Next-generation networks. Introduction. NGN. The vision of the future of telecommunications. Evolution of NGN. Migration control plane functions to the transport plane. Architectures. Generalized MPLS (GMPLS). Operational advantages. Standardization. Mobile-fixed convergence. Mobile-WiFi/WiMax convergence. Challenges and trends. New service models.

Problem sessions and case studies. Parallel to the theoretical sessions, students will arise both a mentored work subject as a collection of problems which aims to help strengthen the concepts worked in the theoretical sessions. In addition, the sharing of resolving such problems the student promises to be critical in the presentation of results as well as proposals made by their peers. This activity combines the non-contact part of individual study, in which each student presents solutions to the proposed problems, along with another physical working party in which they share the answers of all students.

Laboratory class sessions, aimed at the development of techniques and procedures seen in theoretical and applied problems in the world of telecommunications sessions. The breakdown of laboratory practice and the timetable will be implemented at the beginning of the academic year, based on schedules set by the school and the availability of both students and laboratory practices.

Professional events, which aim to make real contact with technologies widely used in the business world. The detail of the companies and their timetable will be implemented at the beginning of the academic year, based on schedules set by the school and the availability of both students and enterprise staff.

4.3.Syllabus

The course will address the following topics:

Unit I. Introduction
T0. Technological, legal and economic context

Unit II. Transport technologies
T1. Plesiochronous Digital Hierarchy (PDH)
T2. Synchronous Digital Hierarchy (SDH)
T3. Wavelength Division Multiplexation (WDM)

Unit III. Protocols and services
T4. X.25 / Frame Relay / ATM
T5. Ethernet and Gigabit Ethernet
T6. Traffic management and congestion control
T7. VLAN. IP. MPLS
T8. VPN. Next-generation networks. NGN

Unit IV. Challenges and Trends
T9. Challenges and Trends
T10. Enterprise networks. Success stories

4.4.Course planning and calendar

Schedule sessions and presentation of works

The timing of the subject and the scheduling of the classroom, theoretical lectures, practical activities and laboratory sessions will be defined by the center in the academic calendar of the corresponding course. The dates for tests, evaluations and other planned activities will be indicated well in advance by the teacher.

4.5.Bibliography and recommended resources

[BB: Bibliografía básica / BC: Bibliografía complementaria]

http://biblos.unizar.es/br/br_citas.php?codigo=30350&year=2019

Listado de URL

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