



Course guides

300048 - XT - Transport Networks

Last modified: 29/06/2020

Unit in charge: Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: 744 - ENTEL - Department of Network Engineering.

Degree: BACHELOR'S DEGREE IN NETWORK ENGINEERING (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING/BACHELOR'S DEGREE IN NETWORK ENGINEERING (Syllabus 2015). (Compulsory subject).

Academic year: 2020 **ECTS Credits:** 4.0 **Languages:** English

LECTURER

Coordinating lecturer: Definit a la infoweb de l'assignatura.

Others: Definit a la infoweb de l'assignatura.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

5. CE 17 TELECOM. Conocimiento y utilización de los conceptos de arquitectura de red, protocolos e interfaces de comunicaciones.(CIN/352/2009, BOE 20.2.2009.)
6. CE 25 TEL. Capacidad de seguir el proceso tecnológico de transmisión, conmutación y proceso para mejorar las redes y servicios. (CIN/352/2009, BOE 20.2.2009.)

Generical:

3. EFFICIENT USE OF EQUIPMENT AND INSTRUMENTATION - Level 3: Design experiments, measurements, subsystems and systems, equipment and tools most appropriate laboratory. Knowing not only benefits but also the limitations of the equipment and resources. Conduct assessments and evaluations critically, making decisions according to the overall system specifications or service.

Transversal:

1. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.
2. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.
4. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.

TEACHING METHODOLOGY

In the first part of the course, there will be a weekly class theory and / or problems of 2h. In the second half of the course there will be sessions of laboratory of 3h to review the theoretical concepts.

The theory classes are essentially lectures by the professor (encouraging active participation), but also asking the students to work certain parts of the subject (self learning), using materials provided by teachers (slides, documents on use cases / datasheets, book chapters, etc.).

The theoretical concepts will be reinforced through exercises when appropriate.

Laboratory sessions will be conducted in groups or individually.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course, students should be able to:

- Follow the technological progress of transmission, switching and process for improving network and telematic services.
- Understand the basics concepts of a transport network
- Evaluate a transport network architecture.
- Analyze protocols and mechanisms for the transport networks.
- Know the functionalities of a control plane in a transport network.
- Apply recovery mechanisms in a reliable optical network.
- Understand the evolution of transport networks.
- Understand the network programmability and automation of transport networks.

STUDY LOAD

Type	Hours	Percentage
Hours small group	17,0	17.00
Hours large group	24,0	24.00
Self study	56,0	56.00
Guided activities	3,0	3.00

Total learning time: 100 h

CONTENTS

(ENG) Introduction to Transport Networks

Description:

Introduction to transport networks technologies.

Full-or-part-time: 4h

Theory classes: 2h

Self study : 2h



(ENG) MPLS-based Transport Technologies

Description:

Network Evolution. Rationale of packet transport
MPLS

- Introduction
- MPLS Benefits
- Elements of MPLS networks
- MPLS Operation
- MPLS with Traffic Engineering (MPLS-TE) recovery mechanisms
- Local and global restoration techniques
- Fast Rerouting

MPLS Services

MPLS Evolution

Segment routing

Related activities:

Controls

Laboratory sessions

Implementation of a project

Full-or-part-time: 82h

Theory classes: 20h

Laboratory classes: 13h

Guided activities: 3h

Self study : 46h

Programming and Automating Transport Networks

Description:

Introduction. Goal of networks automation and programmability

Methodologies

Network Automation tools

Related activities:

Laboratory sessions

Full-or-part-time: 14h

Theory classes: 2h

Laboratory classes: 4h

Self study : 8h

GRADING SYSTEM

Criteria defined in the infoweb subject will be applied.

EXAMINATION RULES.

Controls and laboratory practices are mandatory to pass the subject.



BIBLIOGRAPHY

Basic:

- De Ghein, Luc. MPLS fundamentals. Indianapolis: Cisco Press, 2007. ISBN 9781587051975.
- Vasseur, Jean-Philippe. Network recovery : protection and restoration of optical, SONET-SDH, IP and MPLS. San Francisco: Morgan Kaufmann, 2004. ISBN 012715051X.
- Kasim, Abdu. Delivering carrier Ethernet : extending Ethernet beyond the LAN. New York: McGraw-Hill, cop. 2008. ISBN 9780071487474.
- Zienkiewicz, O. C; Taylor, Richard Lawrence; Zhu, J. Z. The Finite element method : its basis & fundamentals [on line]. 7th ed. Amsterdam [etc.]: Elsevier Butterworth-Heinemann, 2013 [Consultation: 15/05/2020]. Available on: <https://www.sciencedirect.com/science/book/9780750664318>. ISBN 9781856176330.
- Edelman, Jason; Lowe, Scott; Oswalt, Matt. Network Programmability and Automation : skills for the Next-Generation Network Engineer. Sebastopol: O'Reilly Media, [2018]. ISBN 9781491931257.

Complementary:

- Bouillet, Eric. Path routing in mesh optical networks. Chichester ; Hoboken: John Wiley & Sons, 2007. ISBN 9780470015650.
- McDysan, David E. QoS & traffic management in IP & ATM networks. New York [etc.]: McGraw-Hill, 2000. ISBN 0071349596.
- Kumar, Anurag; Manjunath, D.; Kuri, Joy. Communication networking : an analytical approach. Amsterdam: Elsevier/Morgan Kaufmann Publishers, 2004. ISBN 9780124287518.
- Tischer, Ryan; Gooley, Jason. Programming and automating Cisco networks : a guide to network programmability and automation in the data center, campus, and wan. Indianapolis, IN: Cisco Press, [2016]. ISBN 9781587144653.