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Optical Networks

Academic Year: (2020 / 2021)   Review date: 11-07-2020

Department assigned to the subject: Telematic Engineering Department

Coordinating teacher: LARRABEITI LOPEZ, DAVID

Type: Electives ECTS Credits : 3.0

Year : 2 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Switching
Communication Networks and Services

OBJECTIVES

The objective of the course is to study the optical networks from architectural and practical perspectives to provide to the student a wide range of capabilities targeted to model, design, implement, manage, operate, administrate and maintain optical networks.

The student will reach the following knowledge and will be able to apply it to the resolution of problems both specific and multidisciplinary:
·   Main characteristics of the different types of access and transport networks
·   International standards that apply to architectures and protocols of optical networks
·   Principles and rules of modeling and design
·   Network management principles and mechanisms for the operation and maintenance of optical networks
·   Commercially available systems and solutions
·   Forecasted mid and long term evolution of optical networks

Students will be able to integrate all knowledges to evaluate complex requests and to provide its judge.

Students will get the learning skills that will allow them to keep on studding on an autonomous and self-managed way.

Students will be able to communicate its knowledge, conclusions and reasoning in an efficient way.

DESCRIPTION OF CONTENTS: PROGRAMME

· Introduction to Optical Networks
· Access Optical Networks
  - Basic concepts of fiber transmission
  - Access Technologies
  - Passive Optical Networks - GPON
· Optical Transport Network (OTN)
  - General Concepts
  - Fixed Networks
  - Switched Networks
· Network Management
  - ITU-T TMN Framework
  - Network Management Functions
  - OTN Maintenance
· Control Plane
  - ASON Networks
  - Optical label switched paths (Optical LSP)
  - IP-Optical Convergence
· Packet Optical Transport
  - Carrier Ethernet Networks
  - MPLS-TP Networks
· Data Center Interconnection (DCI)
  - DCI general concepts
  - Techniques and interfaces

LEARNING ACTIVITIES AND METHODOLOGY

Activities will be carried out according to the following:

* Lectures: the professor will show the principles and mechanisms of the optical networks that students should learn. Reference documents will be provided: articles, books, specific materials,... Lectures will be interactive to motivate student's participation. Students will also prepare contents that will be presented during the class.

* Practical exercise resolutions and real case presentations: the professor will ask for the resolution of practical cases that should be addressed by service providers or equipment manufacturers. In this way, students will know current situation of networks and its future evolution

ASSESSMENT SYSTEM

The evaluation of the competences will be based on continuous assessment according to the following split:

* Final exam: 60% of the grade. Questions about the knowledge that has been explained by the professor.

* Exercise resolution and assignments about technological cases: 30% of the grade. Students will elaborate and present an assignment about practical cases.

* Active Participation of the students in class: 10% of the grade.

Students that do not participate in the continuous assessment will only be able to get 60% of the grade via the final exam.

Addtionaly, an extraodinary exam will be held. In this case, the grade will be calculated based on two alternatives: just the final exam (100%) and the final exam (60%) plus the continuous assesment (40%). The best alternative will prevail.

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

- A. Clemm Network Management Fundamentals , Cisco Press, 2007

- A.Farrel, I.Bryskin GMPLS Architecture and Applications , Morgan Kaufman, 2006

- J. Tate et al Introduction to Storage Area Networks and System Networking , IBM Red Books, 2012

- J.P. Vasseur, M. Pickavet, P. Demeester Network Recovery , Elsevier, 2004

- J.Simmons Optical Network Design and Planning , Springer, 2008

- M. Maier Optical Switching Networks , Cambridge University Press, 2008