

230698 - OPNET - Optical Networks

Coordinating unit:	230 - ETSETB - Barcelona School of Telecommunications Engineering		
Teaching unit:	739 - TSC - Department of Signal Theory and Communications		
Academic year:	2019		
Degree:	MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Teaching unit Optional) MASTER'S DEGREE IN TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Optional)		
ECTS credits:	5	Teaching languages:	English

Teaching staff

Coordinator:	Comellas Colome, Jaume
Others:	Junyent Giralt, Gabriel Spadaro, Salvatore

Prior skills

Fiber optic communications fundamentals.
Computer networks fundamentals.

Degree competences to which the subject contributes

Specific:

- CE4. Ability to design and dimension transport, broadcast and distribution networks for multimedia signals
- CE3. Ability to implement wired/wireless systems, in both fix and mobile communication environments.
- CE6. Ability to model, design, implement, manage, operate, administrate and maintain networks, services and contents
- CE8. Ability to understand and to know how to apply the functioning and organization of the Internet, new generation Internet technologies and protocols, component models, middleware and services
- CE7. Ability to plan networks and decision-making about services and applications taking into account: quality of service, operational and direct costs, implementation plan, supervision, security processes, scalability and maintenance. Ability to manage and assure the quality during the development process

Transversal:

- CT5. FOREIGN LANGUAGE: Achieving a level of spoken and written proficiency in a foreign language, preferably English, that meets the needs of the profession and the labour market.
- CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.
- CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

Teaching methodology

Lectures, application classes, workgroup assignments, individual assignments

Learning objectives of the subject



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The aim of this course is to give insight of modern techniques used in broadband optical communications networks. Main concepts about key devices involved, traffic engineering, control and management of optical networks, as well as resiliency, will be given considering both, backbone and access networks.

Study load

Total learning time: 125h	Hours large group:	39h	31.20%
	Self study:	86h	68.80%

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Content

<p>Introduction: Optical networks evolution</p>	<p>Learning time: 11h Theory classes: 3h Self study : 8h</p>
<p>Description: Fiber optic communications as well as Optical networks evolution</p> <p>Related activities: Personal assignment</p>	
<p>Optical Network Enabling technologies</p>	<p>Learning time: 14h Theory classes: 4h Self study : 10h</p>
<p>Description: Basic WDM devices review (splitters, filters, switches, WSS) ROADM and OXC</p> <p>Specific objectives: Comprehension of the physical technologies involved in optical networks</p>	
<p>Traffic Engineering Basics</p>	<p>Learning time: 15h Theory classes: 5h Self study : 10h</p>
<p>Description: Routing and wavelength assignment Network performance metrics Resiliency in optical networks</p> <p>Related activities: Individual assignment</p>	

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Control and Management of Optical Networks	Learning time: 13h Theory classes: 5h Self study : 8h
Description: ASON fundamentals. GMPLS controlled networks. Specific objectives: Main characteristics of optical networks management.	
Metro and Access Optical Networks	Learning time: 15h Theory classes: 5h Self study : 10h
Description: Passive optical networks Access networks evolution Specific objectives: Access networks characteristics.	
Packet Switched Optical Networks	Learning time: 11h Theory classes: 3h Self study : 8h
Description: Optical Packet and Burst Switching Technologies Specific objectives: Understanding OPS characteristics and technologiccal requirements	
Energy efficiency in Optical networks	Learning time: 11h Theory classes: 3h Self study : 8h
Description: Networks energy consumption. Green optical networks	

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Elastic/flexgrid optical networks	Learning time: 13h Theory classes: 5h Self study : 8h
Description: Elastic network characteristics and Performance evaluation	
Software Defined Networks (SDN)	Learning time: 11h Theory classes: 3h Self study : 8h
Description: Software defined networks principles. Optical Network Virtualization	
Optical Networks and data centres	Learning time: 12h Theory classes: 4h Self study : 8h
Description: Cloud computing and traffic evolution. Optics in the data center	

Qualification system

Lectures attendance (10%), Workgroup assignments (20%), Individual work (30%), Exam (40%)

Bibliography

Complementary:

Ramaswami, R.; Sivarajan, K.N. Optical networks : a practical perspective. 3a. San Francisco: Morgan Kaufman, 2010. ISBN 9780123740922.

Liu, K.H.. IP over WDM. Chichester: John Wiley and Sons, 2002. ISBN 0470844175.