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230649 - TSYS - Telecommunications Systems

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 TELECOMMUNICATIONS ENGINEERING (Syllabus 2013). (Teaching unit Compulsory)
MASTER'S DEGREE IN ADVANCED TELECOMMUNICATION TECHNOLOGIES (Syllabus 2019). (Teaching unit Optional)

ECTS credits: 5 Teaching languages: English

Teaching staff

Coordinator: RAMÓN AGUSTÍ

Others: RAMÓN AGUSTÍ, FERRAN CASADEVALL, RAMON FERRÚS

Degree competences to which the subject contributes

Specific:

1. Ability to develop radio-communication systems: antennas design, equipment and subsystems, channel modeling, link dimensioning and planning.
2. Ability to implement wired/wireless systems, in both fix and mobile communication environments.
3. Ability to integrate Telecommunication Engineering technologies and systems, as a generalist, and in broader and multidisciplinary contexts, such as bioengineering, photovoltaic conversion, nanotechnology and telemedicine.

Transversal:

4. 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.
5. 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.

Teaching methodology

- Lectures
- Group's work
- Short questions/test (Control and Final exams)

Learning objectives of the subject

Learning objectives of the subject:

The aim of this course is to provide a holistic and high-level approach to the Telecommunication Systems, including their architectures, central functionalities and main technological characteristics. Within this framework, the course will firstly present the basic concepts related to regulation, standardization and services, thus establishing the context for the different Telecommunication Systems that will be subsequently addressed. Then, each one of the key different Telecommunication Systems will be introduced, with the goal of describing and differentiating its main characteristics and capabilities, including the involved technologies, the internetworking level when applicable, as well as their social-economics trends.
After completion of the course students should be able to identifying each one of the main involved technologies and its target objectives within a complete map of existing Telecommunication Systems. Finally, high-level case studies of the different plausible and proper scenarios will be analyzed /studied/ evaluated by means of group's work.

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Study load

Total learning time: 125h	Hours large group:	39h	31.20%
	Hours medium group:	0h	0.00%
	Hours small group:	0h	0.00%
	Guided activities:	0h	0.00%
	Self study:	86h	68.80%

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Content

1. Introduction to Telecommunication Systems and Services

Learning time: 7h 30m
Theory classes: 3h
Self study : 4h 30m

Description:
- Telecommunication Systems concept
- Telecommunication Systems and Services
- Telecommunication Systems and services Taxonomy
- Market models and stakeholders (service and infrastructure providers, regulators, manufacturers, etc.).

2. Regulatory and Standardization Framework

Learning time: 7h 30m
Theory classes: 3h
Self study : 4h 30m

Description:
- Standardization Bodies (ITU-T, ETSI, 3GPP, IEEE SA, etc.)
- Regulatory Framework and regulators (ITU-R RR, CEPT ECC, etc.)

3. PSTN and INTERNET: Evolution

Learning time: 9h
Theory classes: 3h
Self study : 6h

Description:
-Public Switched Telephone Network
-Signaling Systems :CAS and CCS
-PSDN: Packet Switching Data Networks and ISDN
-INTERNET
-Signaling: SIP Protocol

4. Mobile Communications

Learning time: 25h
Theory classes: 10h
Self study : 15h

Description:
-Introduction
-2G, 3G, 4G and 5G
-Professional / Private Mobile Radio (PMR) systems
-Aeronautical systems

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5. Radio Links	Learning time: 15h Theory classes: 5h Self study : 10h

Description:
-Introduction
-Frequency Planning
-Link Budged
-Quality and Availability
-Radio Link Design

6. Satellites	Learning time: 15h Theory classes: 5h Self study : 10h

Description:
-Introduction
-Orbits
-Propagation and link budget
-Frequency bands and multiple access
-Satellite systems architecture
-VSAT: A Case Study

7. Broadband Access Systems and Technologies	Learning time: 12h Theory classes: 4h Self study : 8h

Description:
-Introduction
-X-DSL Systems
-Fiber to the X (FTTX) Concept
-Cable Modem (HFC Networks)
-Power Line Communications
-WIMAX
-Radio over Fibre

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8. NEXT GENERATION NETWORKS: NGN	Learning time: 9h Theory classes: 3h Self study : 6h

Description:
-Introduction NGN
-Architecture NGN
-IP multimedia subsystem: IMS
-IMS SIP
-IMS: Further Considerations and Some Examples

9. Use Cases Presentation	Learning time: 25h Theory classes: 3h Self study : 22h

Description:
-Presentation of different Telecommunication Systems use cases
-Discussion

Qualification system

Final Examination
Partial examination and Controls
Group work
Individual assessments (Attendance/participation in class, etc)

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Bibliography

Complementary:

Telecommunication system engineering. Hoboken, NJ: Wiley, 2004.

Valdar, A. Understanding telecommunication networks. Institution of Engineering and Technology, 2006. ISBN 978-0863413629.

Minoli, D. Telecommunications technology handbook [on line]. 2nd ed. Artech House, 2003 [Consultation: 21/06/2017]. Available on: <http://site.ebrary.com/lib/upcatalunya/docDetail.action?docID=10082038>. ISBN 9781580537087.

Van Bosse, J.G.; Devetak, F.U. Signaling in telecommunication networks. 2nd ed. John Wiley & Sons, 2006. ISBN 978-0471662884.

Hernando Rábanos, J.M.; Riera Salís, J.M.; Mendo Tomás, L. Transmisión por radio. 7a ed. Madrid: Centro de Estudios Ramon Areces, 2013. ISBN 9788499611068.

Huidobro, J.M. Redes y servicios de telecomunicaciones. 4a ed. Madrid: Paraninfo, 2006. ISBN 978-8428329224.

Stalling, W. Data and computer communications. 10 th ed. Prentice Hall, 2014. ISBN 9780133506488.

Others resources:

Ramon Agusti, Course Slides, ETSETB, ATENEA