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: 2020
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: FERRAN CASADEVALL,
Others: RAMÓN AGUSTÍ, FERRAN CASADEVALL

Opening hours

Timetable: Indicated by the teacher at the beginning of the course.

Prior skills

Basic knowledge about communications.

Requirements

None specific to the subject

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

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.

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<th>Study load</th>
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<td><strong>Total learning time:</strong> 125h</td>
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<td>Hours large group:</td>
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<td>TELECOMMUNICATION SYSTEMS</td>
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**Description:**
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Topic 1.- INTRODUCTION TO TELECOMMUNICATION SYSTEMS
1.1 Telecommunication System Definition: Actors and Rolls
1.2 Regulatory authorities and standardization bodies

Topic 2.- REGULATORY AND STANDARDISATION FRAMEWORK
2.1 Telecommunication Market Regulation: Evolution
2.2 Network Neutrality and QoS
2.3 Spectrum Regulation: Regulatory framework for the use of radio spectrum
2.4 Standards: International Standardization Bodies

Topic 3.- FIXED TELECOMMUNICATION SYSTEMS: FROM PSTN TO INTERNET
3.1 PSTN (Public Switched Telephone Network)
   3.1.1 Multiplexing and switching
   3.1.2 Signalling Systems in PSTN
   3.1.3 SS7 and Intelligent Networks
3.2 X.25 (Public Switched Data Networks) Basics
3.3 ISDN (Integrated Services Digital Network): Definition and Bearer Services
3.4 Frame Relay
3.5 ATM (Asynchronous Transfer Mode): Definition and System considerations
3.6 INTERNET
   3.6.1 Concept and main drivers
   3.6.2 Architecture, actors and rolls
   3.6.3 Public and Private Internet
   3.6.3.1 DiffServ Domain
3.7 MPLS (Multiprotocol Label Switching): Reference architecture
3.8 Access Network: Access and aggregation segments definition
3.9 X-DSL (X-Digital Subscriber Line) Systems
   3.9.1 ADSL (Asymmetric-Digital Subscriber Line)
   3.9.2 VDSL (Very high-bit-rate Digital Subscriber Line)
3.10 IP telephony and Multimedia Signalling: H.323 and SIP
3.11 TMN (Telecommunication Network Management): Building blocks.

Topic 4.- CELLULAR MOBILE COMMUNICATIONS SYSTEMS: FROM 1G TO 5G
4.1 Introduction: Definitions, and technology evolution
   4.1.1 General Architecture of a Mobile Communications System
4.2 2G Communications Systems
   4.2.1 GSM System: General features and architecture
   4.2.2 GPRS System: General features and architecture
   4.2.3 EDGE System: General features and EDGE Evolution
4.3 3G Communications Systems
   4.3.1 UMTS and HSPA Systems
4.4 4G Communications Systems: LTE System Main features and architecture
4.5 5G Systems: An introduction
4.6 Radiation Health Effects

Topic 5.- NETWORK VIRTUALIZATION
5.1 Introduction: Server virtualization and data centers
5.2 Network Virtualization
   5.2.1 ETSI NFV reference architecture framework
5.3 Software Defined Networks (SDN): Key Points
5.4 Virtualization in Mobile Communications Systems
Final Examination
Partial examination and Controls
Individual and/or group work
Individual assessments (Attendance/participation in class, etc)

The final exam weighs the 50% final grade. The continuous evaluation (includes the rest of the activities) weighs the other 50% of the final grade.
Bibliography

Complementary:


Others resources:

Ramon Agusti, Ferran Casadevall , Course Slides, ETSETB, ATENEA