Communications Systems Design   **2013/2014**

Code: 42837
ECTS Credits: 6

Degree	Type	Year	Semester
4313797 Enginyeria de Telecomunicacions / Telecommunication Engineering	OB	1	1

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Use of languages

Principal working language: anglès (eng)

Prerequisites

Se requieren conocimientos de comunicaciones digitales y sistemas.

Objectives and Contextualisation

The general objective is to provide a taxonomic view of the communications systems in order to correctly use different design tools and criteria.

More specifically, both theoretical and thecnological elements will be given that need to be handled when designing a communication system.

Different requirements-driven state-of-the-art examples will be analized with focus on the design process.

Skills

Enginyeria de Telecomunicacions / Telecommunication Engineering
- Capacity for applying theory of information methods, adaptative modulation and channel coding as well as advanced techniques for digital signal processing in telecommunications and audiovisual systems.
- Capacity for designing and dimensioning transport, diffusion and distribution networks for multimedia signals.
- Capacity for implementing systems using cable, lines, satellite in fixed and mobile communications environments.
- Capacity for modelling, designing, introducing, managing, operating, administrating and maintaining networks, services and content.
- Capacity for planning, decision-making and packaging of networks, services and applications considering the quality of service, direct and operating costs, the implementation plan, supervision, security procedures, scaling and maintenance and for managing and ensuring quality in the development process.
- Demonstrate an entrepreneurial, creative and innovative spirit
- Student should possess the learning skills that enable them to continue studying in a way that is largely student led or independent
- Students should know how to apply the knowledge they have acquired and their capacity for problem solving in new or little known fields within wider (or multidisciplinary) contexts related to the area of study
- Students should know how to communicate their conclusions, knowledge and final reasoning that they hold in front of specialist and non-specialist audiences clearly and unambiguously

Learning outcomes

1. Demonstrate an entrepreneurial, creative and innovative spirit
2. Design and obtain coding and modulation techniques in communications systems.
3. Design communications systems considering quality requirements and the services offered.
4. Design communications systems considering the quality requirements and the services offered
5. Identify and classify multimedia diffusion and distribution mechanisms in radio access networks.
6. Recognise design strategies for mechanisms to assign resources in radio access networks.
7. Student should possess the learning skills that enable them to continue studying in a way that is largely student led or independent
8. Students should know how to apply the knowledge they have acquired and their capacity for problem solving in new or little known fields within wider (or multidisciplinary) contexts related to the area of study
9. Students should know how to communicate their conclusions, knowledge and final reasoning that they hold in front of specialist and non-specialist audiences clearly and unambiguously

Content

1. Introduction and motivation.

2. What is a system?.

3. Layered design approach.

- Channel modeling.

- Physical layer.

- Access and network.

4. Cross-layer design approach.

- Top-down.

- Bottom-up.

5. Requirements-driven system design.

- User and functional requirements.

- Optimized vs flexible design.

Study case 1.

Study case 2.

Methodology

The methodology will consist of lectures and study cases. The students will be given a full requirements-driven design case after which, teams of students will work on their own design cases.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			

Lectures	40	1.6	2, 3, 4, 5, 6, 7, 8
Type: Supervised			
Practical activities	40	1.6	1, 2, 3, 4, 5, 6, 7, 8, 9
Type: Autonomous			
Students's work	68	2.72	1, 2, 3, 4, 5, 6, 7, 8, 9

Evaluation

The students will present their own study cases dividing the design process in two stages, each of which will be evaluated.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Presentation of Study Case	Presentation	2	0.08	1, 2, 3, 4, 5, 6, 7, 8, 9

Bibliography

1. P. Oppenheimer, "Top-Down Network Design", Cisco systems, 2010.

2. Jeffrey Wheat et All, "Designing a Wireless Network", Syngress; 1st edition 2001.

3. C. Hellberg; Dylan Greene; Truman Boyes, "Broadband Network Architectures: Designing and Deploying Triple-Play Services", Prentice Hall, 2007.

4. Michal Pioro, Deepankar Medhi, "Routing, Flow, and Capacity Design in Communication and Computer Networks" (The Morgan Kaufmann Series in Networking), 2004.

5. Charles S. Wasson, "System Analysis, Design, and Development: Concepts, Principles, and Practices" (Wiley Series in Systems Engineering and Management), 2005.