Universitat Autònoma de Barcelona

2022/2023

Communications Systems Design

Code: 42837
ECTS Credits: 6

Degree	Type	Year	Semester
4313797 Telecommunication Engineering	OB	1	1

Contact

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Use of Languages

Principal working language: english (eng)

External teachers

Aitor Sánchez Abellán

Prerequisites

It is required background on Digital Communications and Communication Systems.

Objectives and Contextualisation

El diseño de ingeniería de sistemas es un campo interdisciplinario hacia la conceptualización, optimización y rea
Los requisitos y funcionalidades de diseño del sistema están orientados
A diferencia de lo que aprende un estudiante universitario de ingeniería,
Los objetivos detallados incluyen que los estudiantes se familiaricen con
Ejemplos reales de diseño de sistemas de comunicaciones serán impart

Competences

- 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 systems considering quality requirements and communications services.
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

Clases teóricas:

1. Introducción: sistema de pensamiento.
2. Diseño de sistemas de ingeniería.
3. Elementos de sistemas de comunicación y sistemas embebidos.
4. Fases de diseño: planteamiento del problema y requisitos.
5. Fases de diseño: arquitectura funcional y física.
6. Fases de diseño: Verificación y validación del sistema (V&V).
7. Codiseño de hardware y software: compensaciones.
8. Definición y estimación de recursos.

Laboratorio:
Sesión 0. Ideación del sistema.
Sesión 1. Declaración del problema y reunión de requisitos.
Sesión 2. Diseño del sistema: arquitectura funcional y física.
Sesión 3. Verificación y validación del sistema (V&V).
Sesión 4. Presentaciones de los proyectos por parte de los alumnos.

Methodology

The methodology will consist of lectures and study cases.

The students will be given two examples of requirements-driven full design study cases after which, teams of students will work on their own (interdisciplinary) design cases.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes

Type: Directed			
Supervised	45	1.8	2, 4, 3, 5, 8, 7, 6
Type: Supervised			
Student's work	15	0.6	1, 2, 4, 3, 5, 8, 9, 7, 6
Type: Autonomous			
Lectures	86	3.44	1, 2, 4, 3, 5, 8, 9, 7, 6

Assessment

Evaluation

- Theory: 50% (individual evaluation)
  - 50% Concepts questionnaire
  - 50% System Functional Analysis
- Laboratory: 50% (team evaluation)
  - 50% Lab Sessions deliverables
  - 50% Final Report and Presentation

Students will have the option to improve the obtained qualifications both, in case of failure or low score (<7).

This will be done by providing the students with a set of specific potential improvements over the presenteddesign, to be delivered before the final qualification is decided.

Students will obtain a "NOT PRESENTED" qualification whenever no evaluation records exist for the student during the overall evaluation period.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
A	A	1	0.04	1, 2, 4, 3, 5, 8, 9, 7, 6
B	0.25	1	0.04	4, 3, 8
C	0.25	1	0.04	1, 2, 4, 3, 5, 8, 9, 7, 6
D	0.25	1	0.04	1, 2, 4, 3, 5, 8, 9, 7, 6

Bibliography

1. Alan Dennis, Barbara Haley Wixom, David Tegarden, "Systems Analysis and Design: An Object Oriented Approach with UML", 5th Edition, Wiley April 2015.
2. Dennis M. Buede, "The Engineering Design of Systems: Models and Methods", Wiley 2009.

Software

Not required.