Emerging Systems

Code: 102698
ECTS Credits: 6

Degree	Type	Year	Semester
2500898 Telecommunication Systems Engineering	OT	4	1

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

Contact

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Use of Languages

Principal working language: catalan (cat)

Some groups entirely in English: No

Some groups entirely in Catalan: Yes

Some groups entirely in Spanish: No

Prerequisites

Have studied the subjects:

- Theory of Communication
- Telecommunication networks

Objectives and Contextualisation

The objective of the subject is to let students become familiar with the methods and technologies related to comn

- The first one is dedicated to wireless communications where the physical layer and access in wireless communication systems is studied, doing a review of all the related aspects.
- The second part of the subject is devoted to current and emerging wireless networks where both broadband (cellular) networks and smaller coverage networks (both local and personal) are presented.
- The last part of the subject is devoted to one of the most popular technological paradigms of today, the Internet of Things. The Internet of Things (IoT) refers to a network of objects of everyday life interconnected. The objects of IoT communicate through wireless networks and an example of application of the networks that are studied to the subject.

Competences

- Apply the necessary legislation in the exercise of the telecommunications engineers profession and use the compulsory specifications, regulations and standards.
- Communication
- Design and dimension multiuser communication systems using the principles of communication theory under the restrictions imposed by the specifications and the need to provide a quality service.
- Develop personal work habits.
- Develop thinking habits.
- Learn new methods and technologies, building on basic technological knowledge, to be able to adapt to new situations.

- Work in a team.

Learning Outcomes

1. Assume and respect the role of the different members of a team, as well as the different levels of dependency in the team.
2. Build, exploit and manage telecommunications networks from the point of view of access technologies.
3. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
4. Develop critical thinking and reasoning.
5. Develop independent learning strategies.
6. Evaluate the advantages and disadvantages of different technological options for the deployment or implementation of emerging communication systems.
7. Manage the radio-electric spectrum and assign frequencies in consideration of the requirements established for emerging communication systems.
8. Prevent and solve problems.
9. Use techniques based on telecommunication networks, services and applications both in fixed and mobile, and local or long distance environments with different bandwidths, including television and data.
10. Work autonomously.

Content

The subject will be divided into 13 theoretical-practical sessions with the following contents:

1. Introduction to the subject
2. Physical layer (Modulation, coding, propagation)
3. Data link layer (Medium access protocols)
4. Network layer (IPv4, IPv6, 6LoWPAN)
5. Transport layer (TCP / UDP)
6. Application layer (REST, MQTT, COAP)
7. Cloud computing
8. Exam
9. Integrated project
10. Integrated project
11. Integrated project
12. Integrated project
13. Integrated project presentation

Methodology

Throughout the course, the following activities will be carried out:

- Theoretical-practical sessions
- Laboratory sessions
- Project sessions

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Labs	12	0.48	1, 3, 2, 4, 7, 9, 6
Practical classes	12	0.48	2, 4, 7, 9, 6

Theoretical classes	26	1.04	3, 2, 4, 7, 9, 6
Type: Supervised			
Problem solving	10	0.4	1, 3, 2, 5, 4, 7, 8, 10, 9, 6
Type: Autonomous			
Problem solving	34	1.36	2, 5, 7, 8, 10, 9, 6

Assessment

The continuous evaluation mark (NFA) is computed as:

NFA = 0.5 * Ex + 0.2 * LabR + 0.2 * Proj + 0.1 * Work if Ex> = 3.5. Otherwise, NFA = Ex.

The lab work (LabR), work (Work) and project (Proj) activities are, by nature, not recoverable. The exam mark (Ex) can be recovered in the recovery exam (ExR).

The final grade of the subject (NF) is calculated as:

NF = max {NFA, 0.5 * ExR + 0.2 * LabR + 0.2 * Proj + 0.1 * Work}. In the same way, if ExR <3.5, NF = ExR.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Course project (Proj)	20%	20	0.8	1, 3, 2, 5, 4, 7, 8, 10, 9, 6
Course work (Work)	10%	20	0.8	3, 2, 4, 7, 8, 10, 9, 6
Exam (Ex)	50%	3	0.12	1, 3, 2, 5, 4, 7, 8, 10, 9, 6
Lab reports (LabR)	(5%, 5%,5%, 5%)	10	0.4	3, 2, 4, 7, 8, 10, 9, 6
Recuperation exam (ExR)	50%	3	0.12	4, 7, 10, 9, 6

Bibliography

1. D. Tse and P. Viswanath, Fundamentals of Wireless Communication, Cambridge University Press, 2005.
2. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2005.
3. Andreas F. Molisch, Wireless Communications, John Wiley and Sons, 2010.
4. C. Beard, W. Stasllings, Wireless communications networks and systems. Pearson. 2015
5. A. Tanenbaum, D. Wetherall. Computer Networks. 5th Edition. Prentice Hall. 2011