

340460 - XASF - Wireless Networks: Technologies and Applications

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit: 744 - ENTEL - Department of Network Engineering
Academic year: 2019
Degree: BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2018). (Teaching unit Optional)
ECTS credits: 6 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: Vidal Ferré, Rafael
Others: Piney Da Silva, Jose Ramon
Vidal Ferré, Rafael

Prior skills

Knowledge of basic concepts of networks (stack of protocols) and the Internet
Basic knowledge of functions and mechanisms of security (authorization, authentication, encryption)
Basic Knowledge of Java Language Knowledge of OOP
Know how to reason about design class charts (MComp in AMEP terminology) and on sequence diagrams.

Degree competences to which the subject contributes

Specific:

I_CEIC4. CEIC4. Ability to design and implement communication systems software.

I_CETI1. CETI1. Ability to understand the environment of an organization and its needs in the field of information technology and communications.

I_CETI6. CETI6. Ability to design systems, applications and services based on network technologies, including internet, website, e-commerce, multimedia, interactive services and mobile computing.

Transversal:

CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CT4. 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.

CT5. 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

Two types of classes will be differentiated, those of theory and those of laboratory. To those of theory, the professor will present in a way

Expositive the knowledge to develop in the subject using transparencies, which will be available with

In advance to attend and, on time, other resources such as technical documentation or examples on the board. At the In the laboratory, it will be initially guided and then progressively autonomous to learn to use the technologies seen in theory in the application application for the Android operating system and more precisely, to develop a small project based on IoT device (Internet of the things).

These sessions will be accompanied by a non-contact work aimed at solving small exercises, challenges or small programming projects.

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Learning objectives of the subject

The subject is designed so that the student acquires a broad base of knowledge, both theoretical and practical, related to networks wireless and in particular of those technologies present in our mobiles.

After completing the course, the student will be able to:

- To explain the basic concepts associated with wireless communications
- Identify the critical parameters that characterize a wireless technology
- To explain the operation of the most widely used wireless technologies in the field of the mobile (2G-4G, Wi-Fi, Bluetooth, NFC, GPS)
- Identify the benefits and functionalities offered by these technologies based on the knowledge of the version of the standards / specifications implemented for a specific commercial product
- Use tools (mobile applications) that allow to analyze the operation of these technologies and their testing
- Select the most suitable wireless technology based on certain requirements
- To explain the particularities of the application of these technologies and of the mobile in an IoT scenario
- Design and develop mobile applications that take advantage of these technologies

Study load

Total learning time: 60h	Hours large group:	30h	50.00%
	Hours small group:	30h	50.00%

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Content

T1-Introduction to wireless networks	Learning time: 22h Theory classes: 3h Laboratory classes: 6h Self study : 13h
Description: Spectrum, attenuation, noise, interference, signal noise ratio (SNR), sensitivity, relation between capacity according to the SNR, access to the environment Related activities: [app] [proj_1]	
T2-Mobile communication networks	Learning time: 24h Theory classes: 4h Practical classes: 6h Self study : 14h
Description: Description of the network, operator-paid relationship (SIM), technologies, performance and services. Related activities: [app] [proj_2]	
T3-Wi-Fi	Learning time: 21h Theory classes: 4h Laboratory classes: 3h Self study : 14h
Description: Standard IEEE802.11 (evolution, features, performance and certifications), 2,4 GHz vs. 5 GHz ISM bands (available channels vs. propagation), network types (infrastructure, ad-hoc, mesh), frames (MAC addresses, type and format), security. Related activities: [app] [proj_3]	

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T4-Bluetooth	Learning time: 24h Theory classes: 4h Laboratory classes: 6h Self study : 14h
Description: Specifications (evolution, features and performance), Bluetooth Classic (topology, performance and services), Bluetooth Low Energy (topology, performance and services), types of devices (beacons). Related activities: [app] [proj_4]	
T5-NFC	Learning time: 20h Theory classes: 2h Laboratory classes: 6h Self study : 12h
Description: Bases of operation and elements (tags), types of communication and performance. Applications (identity, stock automation). Related activities: [app] [proj_5]	
T6-GPS	Learning time: 11h Theory classes: 1h Laboratory classes: 3h Self study : 7h
Description: System description, benefits, alternative satellite location systems (Glonass, Beidou, Galileo) and no satellite (RTLS, Real Time Locating System). Related activities: [app] [proj_3]	

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T7-Internet of Things	Learning time: 28h Theory classes: 12h Self study : 16h
Description: Definition of the concept, type of devices (sensors, actuators, memory, CPU) and key technologies related to the mobile (Wi-Fi, BLE and NFC), fields of application (home, city, vehicles, industry ...) and development of solutions (value chain). Related activities: [app] [iot]	

Qualification system

20% exam content (week of partial)

15% activity [app]

15% activity [iot]

50% Project, divided into:

‡ 10% delivery activity [proj_1]

‡ 10% delivery activity [proj_2]

‡ 10% delivery activity [proj_3]

‡ 10% delivery activity [proj_4]

‡ 10% delivery activity [proj_5]

In case the mark of the exam condition the approved of the subject, it would be offered its recovery in the week of final examinations and then as a re-evaluation.

Bibliography