# 30349 - Access Networks

**Información del Plan Docente**

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|---|---|
| **Academic Year** | 2016/17 |
| **Academic center** | 110 - Escuela de Ingeniería y Arquitectura |
| **Degree** | 438 - Bachelor's Degree in Telecomunications Technology and Services Engineering |
| **ECTS** | 6.0 |
| **Course** | 3 |
| **Period** | First semester |
| **Subject Type** | Compulsory |
| **Module** | --- |

## 1.Basic info

## 1.1.Recommendations to take this course

## 1.2.Activities and key dates for the course

## 2.Initiation

## 2.1.Learning outcomes that define the subject

## 2.2.Introduction

## 3.Context and competences

## 3.1.Goals

## 3.2.Context and meaning of the subject in the degree

## 3.3.Competences

## 3.4.Importance of learning outcomes

## 4.Evaluation

## 5.Activities and resources

## 5.1.General methodological presentation

The teaching-learning methodologies to be undertaken to achieve the proposed learning results are as follows:

**Participatory lecture** (46 hours). Presentation by the teacher of the main contents of the subject, combined with the active participation of students. This activity will take place in the classroom in person. This methodology, supported with the individual student's study is designed to provide students with the theoretical foundations of the subject content.

**Problem-based learning sessions** in the classroom (10 hours). Problem solving and practical cases proposed by the teacher, with the possibility of exposing them by students individually or in groups authorized by the teacher. This activity will take place in the classroom in person, and may require preparatory work by students.

**Lab sessions (** 4 hours) This activity will take place in the laboratory. It is mandatory, and may require preparatory work by students.

**Tutored practical works** (30 hours). This activity will advance all proposed learning outcomes. Follow-up sessions will be conducted by the teacher in which each student will present their work.

**Personalized attention to students through tutorials.**

**Assessment tests.**

**Personal work of the student** .

## 5.2.Learning activities

- Theoretical/practical sessions in the classroom practices, whose main contents are organized as described in detail in the next section.
- Lab and tutored practical work aimed at solving practical cases analysis, design, dimensioning and planning of access networks by applying techniques and procedures seen in theoretical and problem sessions. The evolution of the work will be presented periodically to the teacher and an explanatory final report of solving methodology followed by the student and justification of the proposed solution will be delivered.

## 5.3.Program

**Block 0. Introduction** .

- *Course presentation.*

- *General concepts:* Access networks vs transport networks. Overview of basic concepts of access technologies and networks. Access technologies classification.

**Block 1. Fixed Access Networks**

- *Introduction.* Types and transmission characteristics of wired physical mediums. Overview of main types of wired access technologies and networks. Use cases, services and applications.

- *Wireless technologies description. General characteristics.* Standards and variants. Network topologies and functional elements of the network architectures. Multiple access techniques and protocols. Service management and QoS provision. Capacity estimation and performance evaluation. Planning, dimensioning and deployment optimization.

  - *Copper access technologies. Standards for xDSL and comparison.*

  - *Hybrid-Fiber Coax technologies (HFC)*

o
*Broadband Fiber Access Technologies (FTTx)*

o
*Other wired access technologies: Power Line Communications (PLC), Ethernet in the first mile (EFM).*

## Block 2. Wireless Access Technologies

- *Introduction. Characteristics of the wireless channel.* Fundamentals of wireless communication and challenges. Regulation aspects. Overview of types of wireless communication technologies and networks. Specific use cases, services and applications. Mobility implications.

- *Wireless technologies description.* Main characteristics. Standards and variants. Network topologies and functional elements of the network architectures. Multiple access principles and radio interface protocols. Radio resource management and QoS provision. Capacity estimation and performance evaluation. Planning, dimensioning and deployment optimization. Mobility support.

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*Wireless Local Area Network. IEEE 802.11 family standards: WiFi*

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*Wireless Metropolitan Area Networks. IEEE 802.16 family standards: WiMAX*

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*Digital Enhanced Cordless Telecommunications: DECT*

o
*Other wireless access technologies: Wireless Personal Area Network WPAN (WPAN): Bluetooth, Zigbee. Wide Area Cellular Networks (GSM, UMTS, LTE) .*

## 5.4.Planning and scheduling

The schedule of the course will be defined by the EINA in the academic calendar of the corresponding course.

## 5.5.Bibliography and recomended resources
- 1. Tanenbaum, Andrew Stuart. Computer networks / Andrew S. Tanenbaum . - 4th. ed. @edicionInternational ed. Upper Saddle River, New Jersey : Prentice Hall PTR, cop. 2003
- 2. Roshan, Pejman. 802.11 Wireless LAN Fundamentals / P. Roshan, J. Leary Cisco Press, 2003
- 3. Walke, B.H. IEEE 802 Wireless Systems. Protocols, Multi-hop Mesh/Relaying, Performance and Spectrum Coexistence / B.H. Walke, S. Mangold, L. Berlemann Wiley, 2006.
- 4. Gast, Matthew S.. Redes wireless 802.11 / Matthew S. Gast Madrid : Anaya Multimedia, D.L. 2005
- 5. Perahia, E. Next Generation Wireless LANs: Throughput, Robustness, and Reliability in 802.11n / E. Perahia, R. Stacey. Ed. Cambridge University Press, 2008.
- 6. Andrews, J.G. Fundamentals of WiMAX : understanding broadband wireless networking / J. G. Andrews, A. Ghosh, R. Muhamed Ed. Prentice-Hall, 2007.
- 7. Nuaymi, L. WiMAX Technology for Broadband Wireless Access / L. Nuaymi Ed. Wiley, 2007.
- 8. Mobile WiMAX / Kwang-Cheng Chen, J. Roberto B. de Marca (editores) Ed. Wiley, 2008
- 9. Katz, M.D. WiMAX Evolution: Emerging Technologies and Applications / M. D. Katz, F. H. P. Fitzek (editores) Ed. Wiley, 2009.
- http://www.wimaxforum.org/
- http://standards.ieee.org/getieee802/802.16.html
- http://www.bluetooth.com/Bluetooth/Technology/Building/Specifications/Default.htm

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- http://www.dect.org/
- http://www.cat-iq.org