

BASIC DETAILS:

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| Subject: | SISTEMAS AVANZADOS DE COMUNICACIONES | | |
| Id.: | 33439 | | |
| Programme: | DOBLE GRADO EN INGENIERÍA INFORMÁTICA Y BIOINFORMÁTICA | | |
| Module: | COMUNICACIONES | | |
| Subject type: | OBLIGATORIA | | |
| Year: | 4 | Teaching period: | Primer Cuatrimestre |
| Credits: | 6 | Total hours: | 150 |
| Classroom activities: | 68 | Individual study: | 82 |
| Main teaching language: | Inglés | Secondary teaching language: | Castellano |
| Lecturer: | ROMERO GIL, SERGIO (T) | Email: | sromero@usj.es |

PRESENTATION:

Advanced Communications Systems is divided into 2 parts: In the first one, Guided Access and Transport Technologies, foundations and performance of those communications systems that use the copper cable or the fiber as transmission medium are explained. In the second one, Radio Access Technologies, the impairments of the radio communications are exposed and afterwards the different technologies that have been used in the recent years are described.

PROFESSIONAL COMPETENCES ACQUIRED IN THE SUBJECT:

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| General programme competences | G02 | Innovative capacity to propose and find new and efficient ways to undertake any task and/ or function within the professional environment - highly motivated by quality. |
| | G03 | Capacity to work in multidisciplinary teams to achieve common objectives, placing group interests before personal ones. |
| | G04 | Capacity to always commit to working responsibly - creating a strong sense of duty and fulfilment of obligations. |
| | G06 | Capacity to analyse and find a solution to complex problems or unforeseen situations which may arise while working in any type of socio-economic organisation. |
| | G10 | Critical and analytical capacity when assessing information, data and courses of action. |
| | G12 | Capacity to undertake professional activities with integrity, respecting social, organisational and ethical norms. |
| | G13 | Capacity to use individual learning strategies aimed at continuous improvement in professional life and to begin further studies independently. |
| | G14 | Capacity for abstraction to handle various complex knowledge models and apply them to examining and solving problems. |
| | G15 | Capacity to structure reality by means of linking objects, situations and concepts through logical mathematical reasoning. |
| Specific programme competences | E01 | Capacity to understand the engineering profession and commitment to serve society under the corresponding professional code of conduct. |
| | E02 | Capacity to apply the intrinsic engineering principles based on mathematics and a combination of scientific disciplines. |
| | E03 | Capacity to recognise the technical principles and apply the appropriate practical methods satisfactorily to analyse and solve engineering problems. |
| | E08 | Capacity to communicate productively with clients, users and colleagues both orally and in writing, so as to pass on ideas, solve conflicts and achieve agreements. |
| | E10 | Capacity to understand and assess the impact of technology on individuals, organisations, society and the environment, including ethical, legal and political factors, recognising and applying the pertinent standards and regulations. s éticos, legales y políticos, reconociendo y aplicando los estándares y regulaciones oportunos |
| | E11 | Capacity to remain up-to-date in the technological and business worlds in the area of information and communication technologies. |
| | E13 | Capacity to identify, assess and use current and emerging technologies, considering how they apply in terms of individual or organisational needs. |
| | E17 | Capacity to identify and analyse user needs with the intention of designing effective, usable IT solutions which can be incorporated into the user's operating environment. |
| | E18 | Capacity to identify and define the requirements to be satisfied by IT systems to cover the stated needs of organisations or individuals. |
| | E19 | Capacity to design and define the architecture of IT systems (software, hardware and |

communications) under the requirements agreed upon by the parties involved.

PRE-REQUISITES:

These requirements should be fulfilled:

- Mathematics: It is important to know how to use and calculate logarithms, logarithmic units and exponential equations.

- Networks: General knowledge of the OSI stack.

SUBJECT PROGRAMME:

Subject contents:

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| 1 - GUIDED ACCESS AND TRANSPORT TECHNOLOGIES |
| 1.1 - Introduction and Basic Concepts |
| 1.2 - xDSL Systems |
| 1.3 - Optical Systems |
| 1.4 - Hybrid Systems |
| 2 - RADIO ACCESS TECHNOLOGIES |
| 2.1 - Introduction |
| 2.2 - WiFi and WiMAX |
| 2.3 - 2nd Generation Mobile Systems |
| 2.4 - 3rd Generation Mobile Systems |
| 2.5 - 4th Generation Mobile Systems |

Subject planning could be modified due unforeseen circumstances (group performance, availability of resources, changes to academic calendar etc.) and should not, therefore, be considered to be definitive.

TEACHING AND LEARNING METHODOLOGIES AND ACTIVITIES:

Teaching and learning methodologies and activities applied:

- Master classes to explain the theoretical concepts.
- Problem solving classes to better understand the theoretical concepts.
- Realization of practices to utilize the learned concepts in an environment closer to reality.
- Individual work for the maturity of the acquired knowledge.
- Group activities to develop the ability to interact with other professionals.

Student work load:

| Teaching mode | Teaching methods | Estimated hours |
|-----------------------------|---|-----------------|
| Classroom activities | Master classes | 24 |
| | Other theory activities | 6 |
| | Practical exercises | 8 |
| | Practical work, exercises, problem-solving etc. | 8 |
| | Debates | 2 |
| | Coursework presentations | 4 |
| | Films, videos, documentaries etc. | 6 |
| | Workshops | 2 |
| | Laboratory practice | 4 |
| | Assessment activities | 4 |
| Individual study | Tutorials | 2 |
| | Individual study | 28 |

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|-----------------------------------|------------|
| Individual coursework preparation | 18 |
| Group coursework preparation | 15 |
| Research work | 12 |
| Compulsory reading | 4 |
| Recommended reading | 3 |
| Total hours: | 150 |

ASSESSMENT SCHEME:

Calculation of final mark:

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|------------------------|--------------|
| Written tests: | 60 % |
| Individual coursework: | 20 % |
| Group coursework: | 20 % |
| TOTAL | 100 % |

*Las observaciones específicas sobre el sistema de evaluación serán comunicadas por escrito a los alumnos al inicio de la materia.

BIBLIOGRAPHY AND DOCUMENTATION:

Basic bibliography:

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| J.F. Andrews, A. Ghosh, R. Muhamed. Fundamentals of WiMAX: Understanding Broadband Wireless Networking, Prentice Hall, ISBN 0-13-222552-2. |
| R. Steele, L. Hanzo, Mobile Radio Communications, 2ª Edición, John Wiley |
| T.S. Rappaport, Wireless Communications: Principles and Practice, 2ª Edición, Prentice Hall, 2001. |
| P. France, Local Access Network Technologies, Institution of Electrical Engineers, 2004 |
| S. V. Kartalopoulos, Next Generation Intelligent Optical Networks - From Access to Backbone, Springer, 2008 |
| B. Chomysz, Planning Fiber Optic Networks, McGraw Hill, 2009 |
| J. M. Hernando Rábanos, Comunicaciones móviles, Ed. Centro de Estudios Ramón Areces, 1997. |

Recommended bibliography:

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| F. Pérez, S. Pagel, Introducción a las comunicaciones móviles, Servicio de Publicaciones de la Universidad de Vigo, 1997. |
| W.C.Y. Lee, Mobile Communications Design Fundamentals, 2ª Edición, Wiley-Interscience, 1993. |
| S.M. Redl, M.K. Weber, M.W. Oliphant, GSM and Personal Communications Handbook, Artech House Publishers, 1998. |
| J.M. Hernando Rábanos, Comunicaciones móviles. GSM, Fundación Airtel, 1999. |
| J.M. Hernando Rábanos, C. Lluch Mesquida, Comunicaciones móviles de tercera generación. UMTS (Volúmenes 1 y 2), Telefónica Móviles España, 2000. |
| P. Golden, H. Dedieu, K. S. Jacobsen, Implementation and Applications of DSL Technology, Auerbach Publications, 2008 |
| C. Hellberg, D. Greene, T. Boyes, Broadband Network Architectures – Designing and Deploying Triple-Play Services, Prentice Hall, 2007 |
| A. Gumaste, T. Antony, First Mile Access Networks and Enabling Technologies, Cisco Press, 2004 |
| A. Shami, M. Maier, C. Assi, Broadband Access Networks - Technologies and Deployments, Springer, 2009 |
| J. Crisp, Introduction to Fiber Optics (2nd Ed.), Newnes, 2001 |
| J. Riddel, PacketCable Implementation, Cisco Press, 2007 |

Recommended websites:

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| GSM World | http://www.gsmworld.com/ |
| IEEE 802.16 | http://www.ieee802.org/16/ |
| WiMAX Forum | http://www.wimaxforum.org/ |
| 3GPP | http://www.3gpp.org/ |
| ITU-T | http://www.itu.int/ITU-T/ |
| Broadband Forum | http://www.broadband-forum.org/ |
| CableLabs | http://www.cablelabs.com/ |

