IDENTIFYING DATA

(*)Redes Inalámbricas

Subject	(*)Redes Inalámbricas			
Code	V05M026V01205			
Study programme	(*)Máster Universitario en Aplicacións de Procesado de Sinal en Comunicacións (SIGMA)			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	1st	2nd
Teaching language	Spanish Galician			
Department				
Coordinator	López Bravo, Cristina			
Lecturers	Gil Castiñeira, Felipe José López Bravo, Cristina			
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Web	http://faitic.uvigo.es			
General description	This course examines various aspects of communications in wireless networks, with particular emphasis on the study of the evolution of different wireless networking technologies, architectures, protocols and interoperability. Nowadays, users are demanding continuos connectivity even while moving. In order to make this feasible, technicians should be familiarized with technologies and protocols that allow wireless networks interoperability. This course is necessary for those professionals intereseted in the deployment, the design of protocols, and the study of wireless networks, or that wish to have a deep knowledge of distinct wireless networks: from the local area networks such as Wi-Fi, to last generation voice and data networks (3G, Wimax, or LTE, among others).			

Competencies

Code

A2	(*)Adquirir a capacidade de criticar, cuestionar e propoñer melloras dos métodos e algoritmos que coñecen
A5	(*)Coñecer os sistemas de comunicacións concretos, de especial relevancia na actualidade ou nun futuro inmediato
B2	(*)Familiarizarse coa metodoloxía e organización do traballo nos proxectos que levan a cabo as empresas, participando para iso nos proxectos de I + D das empresas do sector das telecomunicacións que manteñen relacións cos departamentos que impulsan este mestrado

Learning aims

Expected results from this subject	Typology	Training and Learning Results
Increase the analytical and critical skills to understand the needs and provide solutions in the field of mobile communications.	Know How	A2
Apply knowledge of wireless networks to professional practice.	Know How	A5
Improve the ability to solve problems and make decisions in the field of wireless networks.	Know How	A2
Improve capabilities in research and innovation areas in the field of data communication wireless networks.	Know How	A5
Promote oral presentation and discussion skills.	Know How	B2
Ability to work in groups.	Know be	B2

Contents

Topic

I. Introduction	1. Historical evolution of wireless networks 1.1. Historical evolution since the first transmissions of Marconi, radio, television, cellular telephony revolution and broadband connection 2. Environment characteristics 3. Physical layer 4. Medium access control alternatives
II. Principles of operation of wireless networks	1. Topology 1.1 Cellular topology 2. Planning 3. Mobility 3.1 Localization 3.2 Handoff 3.3 Mobile IP
III. Wireless PAN and Wireless Sensor Networks (WSN)	1. Bluetooth 2. ZigBee 3. Wireless Sensor Networks (WSN) 4. Delay Tolerant Networks (DTN)
IV. Wireless LAN	1. Introduction and historical evolution 2. IEEE 802.11 family 2.1. Physical layer 2.2. Medium Access Control 2.3. Security and access control 2.4. Quality of service 3. Network architectures (ad-hoc mode and infrastructure mode) 4. MANETs (Mobile Adhoc Networks) 4.1. Routing Protocols 5. VANETs (Vehicular Adhoc Networks)
V. Wireless WAN: WiMAX	1. Introduction and historical evolution 2. IEEE 802.16 2.1. Physical layer 2.2. Medium Access Control 2.3. Security and access control 2.4. Quality of service 3. IEEE 802.16e mobility
VI. Telephony and data networks	1. Introduction and historical evolution 2. GSM 3. GPRS 4. UMTS (3G) 5. HSDPA (3.5G) 6. 4G and LTE 7. User terminals (HW & SW architectures)
VII. Mid-time evolution	1. Presentations on: - Evolution of networks in wireless communication - Wireless Ubiquitous networks - New services over wireless networks

Planning

	Class hours	Hours outside the classroom	Total hours
(*) Prácticas de laboratorio	24	16	40
(*)Titoría en grupo	2	2	4
(*)Seminarios	10	10	20
(*)Sesión maxistral	18	30	48
(*)Informes/memorias de prácticas	0	8	8
(*)Traballos e proxectos	4	20	24
(*)Probas de resposta curta	0	6	6

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
(*) Prácticas de laboratorio	Practical activities in the laboratory, following the outlines provided by the professors and the preparation of reports collecting the results, measurements and observations made during the practices.
(*)Titoría en grupo	Tutorials on papers and projects
(*)Seminarios	Lectures from experts and exhibition of the results and conclusions of students individual works.
(*)Sesión maxistral	Oral presentation of the theoretical concepts of the course by professors, supported by computer and audiovisual contents.

Personalized attention

Methodologies	Description
Titoría en grupo	Students will have access to all the documentation of the course (slides employed in the classroom, scripts and questionnaires of practices, documentation for the seminars, recommended reading research papers) through the platform TEMA (http://faitic.uvigo.es).To solve possible doubts a forum will be available for students to receive answers from professors or from their own mates. Besides, they will be able to use e-mail and tutorials.
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Assessment

	Description	Qualification
(*)Informes/memorias de prácticas	Reports of practical activities	50
(*)Traballos e proxectos	Searchingfor and reading scientific articles on the technologies considered in the subject and critical comments elaboration.	25
(*)Probas de resposta curta	Written test (essay, objective test, resolution of problems, short answer test, multiple answer test, etc)	25

Other comments on the Evaluation

Individual tutorials will be available to help students in the resolution of the practical activities, in the understanding of scientific articles and in the development of the individual work that the students do on hot topic about a subject related to course.

To pass the course it is necessary to fulfil the following conditions:

- Attend to the 80% of the practical activities, and complete their reports.
- Submit at least a work on a current topic related to the contents of the course.
- Score at least a 50% of the qualification assigned to each evaluation block (written tests, individual works and projects and reports of practices).

Students who are not sucessful in passing te course, will have a second attempt to fulfil the three conditions specified in the previous paragraph.

Sources of information

Basic bibliography:

1. Kaveh Pahlavan, Prashant Krishnamurthy, Principles of Wireless Networks: The Unified Approach, Prentice Hall (2001). ISBN-10: 0130930032.
2. Andrea Goldsmith, Wireless Communications, Cambridge University Press (2005). ISBN-10: 0521837162.
3. Ron Olexa, "Implementing 802.11, 802.16, and 802.20 Wireless Networks: Planning, Troubleshooting, and Operations", Newnes (2004). ISBN-10: 0750678089.
4. Holger Karl, Andreas Willing, "Protocols and architectures off wireless sensor networks", Jonh Willey (2007). ISBN: 978-0-470-51923-3.
5. H. Karl, IT. Willing. "Protocols and Architectures off Wireless Sensor Netoworks". Wiley, 2005.
6. Jochen H. Schiller. "Mobile Communications". Second Edition. Addison-Wesley, 2003. ISBN: 0321123816.
7. Stephen Farrel, Vinny Cahill , Delay- and Disruption- Tolerant Networking. Artech House, 2006. ISBN: 978-1-59693-063-6
8. N. Bulusu, S. Jha (Eds.). Wireless Sensor Networks: The Systems Perspective. Artech House, 2005.

Complementary bibliography:

- Guides of the subjects of theory (available in TEMA).
- Guides of the practices of laboratory (available in TEMA).
- Resources Web:

- Http://www.bluetooth.com
- Http://www.zigbee.org
- Http://www.uwbforum.org
- Http://www.dtnrg.org
- Http://www.wi-fi.org
- Http://wimaxforum.org
- Http://gsmworld.com
- Http://umts-forum.com
- Electronic library IEEExplore

Recommendations