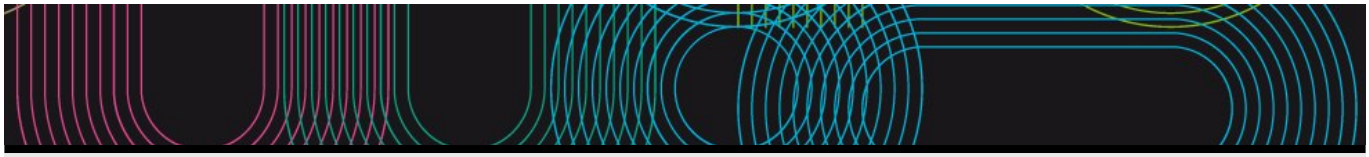

IDENTIFYING DATA				
Wireless and mobile networks				
Subject	Wireless and mobile networks			
Code	V05G306V01402			
Study programme	Bachelor Degree in Telecommunication Technologies Engineering (BTTE)			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	4th	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	López Bravo, Cristina			
Lecturers	Candal Ventureira, David Fondo Ferreiro, Pablo López Bravo, Cristina			
E-mail	clbravo@det.uvigo.es			
Web	http://moovi.uvigo.gal			
General description	The subject "Wireless and Mobile Networks" (redes sen fíos e móbiles) examines the area of wireless and mobile networks, one of the technological basis of the present society, studying the existing challenges for the communications protocols, and looks at the opportunities that provides continuous connectivity even in movement. The focus of this subject will be on network protocols above physical layer (nevertheless, it will touch the most important physical layer properties). The documentation will be available in english. English Friendly subject: International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

Training and Learning Results	
Code	
B3	CG3: The knowledge of basic subjects and technologies that enables the student to learn new methods and technologies, as well as to give him great versatility to confront and adapt to new situations
B4	CG4: The ability to solve problems with initiative, to make creative decisions and to communicate and transmit knowledge and skills, understanding the ethical and professional responsibility of the Technical Telecommunication Engineer activity.
B9	CG9: The ability to work in multidisciplinary groups in a Multilanguage environment and to communicate, in writing and orally, knowledge, procedures, results and ideas related with Telecommunications and Electronics.
C85	(CE85/OP28) The ability to analyze, plan and deploy wireless communication networks for different coverage ranges: metropolitan, local and short range.
D2	CT2 Understanding Engineering within a framework of sustainable development.
D3	CT3 Awareness of the need for long-life training and continuous quality improvement, showing a flexible, open and ethical attitude toward different opinions and situations, particularly on non-discrimination based on sex, race or religion, as well as respect for fundamental rights, accessibility, etc.
D4	CT4 Encourage cooperative work, and skills like communication, organization, planning and acceptance of responsibility in a multilingual and multidisciplinary work environment, which promotes education for equality, peace and respect for fundamental rights.

Expected results from this subject	
Expected results from this subject	Training and Learning Results

Understand the main concepts of wireless communications.	B3	C85	D2 D3
Understanding of the fundamental concepts of morphology and the syntax, applied to the description of the first foreign language (English).			
Understand the main concepts of mobile communications.	B3	C85	D2 D3
Know the main protocols used in wireless communication networks.	B3	C85	D2 D3
Know the architectures used in wireless communication networks.	B3	C85	D2 D3
Ability to design mobile wireless networks.	B4 B9	C85	D2 D3 D4

Contents

Topic	
Introduction to wireless communications	Channel characteristics Multiple access Modulation
Principles of operation of wireless networks	Mobility management Introduction to ubiquitous computing Ad hoc networks, routing Security Network topologies
Wide area networks	Architecture Mobile networks Network topologies Case study
Local networks	Architecture: ad hoc and infrastructure based networks User authentication approaches Security Case study
Low range networks	Architecture Bandwidth/power consumption balance Personal communication Industrial communication

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	19	38	57
Laboratory practical	12	24	36
Mentored work	6	30	36
Problem and/or exercise solving	2	0	2
Report of practices, practicum and external practices	0	3	3
Systematic observation	2	0	2
Project	1	13	14

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

Methodologies

	Description
Lecturing	Professors present the main theoretical contents related to wireless and mobile networks. Through this methodology the competencies CG3 and CE85 are developed.
Laboratory practical	Students will complete guided and supervised practices. Through this methodology the competencies CG3, CG4 and CE85 are developed.
Mentored work	Team development of the design, implementation and validation of a protocol, system, application or service. Through this methodology the competencies CG3, CG4, CG9, CE85, CT2, CT3 and CT4 are developed.

Personalized assistance

Methodologies	Description
Lecturing	The professors of the course will provide individual attention to the students during the course, solving their doubts and questions. Questions will be answered during the master sessions or during tutorial sessions. Tutorial sessions could be agreed by appointment (https://moovi.uvigo.gal/user/profile.php?id=11583).

Mentored work	The professors of the course will provide individual attention to the students during the course, solving their doubts and questions. Questions will be answered during the supervising sessions or during tutorial sessions. Tutorial sessions could be agreed by appointment (https://moovi.uvigo.gal/user/profile.php?id=11583).
Laboratory practical	The professors of the course will provide individual attention to the students during the course, solving their doubts and questions. Questions will be answered during the lab sessions or during tutorial sessions. Tutorial sessions could also be agreed by appointment (https://moovi.uvigo.gal/user/profile.php?id=11583).

Assessment

	Description	Qualification	Training and Learning Results
Problem and/or exercise solving	Continuous assessment: Two individual tests will be given to evaluate the understanding of the contents presented in the lectures. One in the middle of the term and another one at the end. Global assessment: There will be an individual test to evaluate the comprehension of the contents presented in the lectures, in the School's examination period in ordinary exams.	30	B3 C85
Report of practices, practicum and external practices	Students will individually complete questionnaires and/or reports of practices where they will show the correct completion and understanding of the practices.	20	B3 C85 B4
Systematic observation	During the realization of the mentored work/project, there will be a continuous monitoring of the design and the evolution of the development. The monitoring will be group and individual: each member of the group must document the tasks developed within his team and answer for them.	10	B3 C85 D2 B4 D3 B9 D4
Project	Students will be divided into groups to design, develop and test a protocol, system, application or service using wireless and mobile network technologies. The result will be evaluated after delivery, assessing aspects such as correctness, quality, performance and functionality. The evaluation will take into account both the results of the group and the individual contributions of each of its members.	40	B3 C85 D2 B4 D3 B9 D4

Other comments on the Evaluation

Following the guidelines of the degree, each student will have two assessment opportunities (ordinary and extraordinary) to pass the subject. In turn, in the ordinary opportunity, they will have two evaluation procedures (continuous and global).

Ordinary exam

During the first month, students must declare if they opt for continuous or exam-only assessment. Students who select continuous assessment and submit the first task or lab report may not be listed as "Not Present".

Continuos assessment

The final grade (FG) of the course will be calculated as the weighted geometric mean of the grades obtained in the problem-solving tests (PT), in the practical reports (PR), during the systematic observation (SO) and for the completion of the project (P), according to the following formula:

FG = PR^0.3*PR^0.2*SO^0.1*P^0.4.

In order to pass the course, FG must be greater than or equal to 5. In addition, as a result of the application of the weighted geometric mean, it is not possible to have a zero in any of the parts in order to pass the course.

Global evaluation

Students that opt by the global assessment procedure, must submit an additional dossier with detailed information about the events and issues that arose during the execution of the different tasks, and especially the mentored work, since it will not be possible to assess systematic observation. In addition, during the first month of the course, professors will notify students if they have to do the mentored work individually or in group.

The final grade (FG) of the course will be calculated as the weighted geometric mean of the grades obtained in the problem-solving tests (PT), in the practical reports (PR), in the dossier of task performance (DT) and for the completion of the project (P), according to the following formula:

FG = PR^0.3*PR^0.2*DT^0.1*P^0.4.

In order to pass the course, FG must be greater than or equal to 5. In addition, as a result of the application of the weighted geometric mean, it is not possible to have a zero in any of the parts in order to pass the course.

Extraordinary exam

The assessment system will be the same as the global assessment of the ordinary exam.

Students that have opted by the continuous assessment procedure, can decide to maintain the grades of the parts they have already passed in the first call or discard them.

End-of-program exam

The assessment system will be the same as the global assessment of the ordinary exam.

Other comments

The grades obtained are only valid for the current academic year.

Although the tutored work will be completed (if possible) in groups, the performance of each student in his or her group will be monitored continuously. In the case in which the performance of a member of the group wouldn't be adequate compared with the performance of his or her team mates, he or she could be excluded from the group and/or qualified individually.

The use of any material during the tests will have to be explicitly authorized.

Plagiarism is regarded as serious dishonest behavior. If any form of plagiarism is detected in any of the tests or exams, the final grade will be FAIL (0), and the incident will be reported to the corresponding academic authorities for prosecution.

Sources of information

Basic Bibliography

Coty Beard, William Stallings, **Wireless communication networks and systems**, 1, Financial Times Prentice Hall, 2015

Ramón Agustí, et al., **LTE: Nuevas tendencias en comunicaciones móviles**, 1, Fundación Vodafone España, 2010

Viajy Garg, **Wireless Communications and Networking**, 1, Morgan Kaufmann-Elsevier, 2007

Pei Zheng, Larry L. Peterson, Bruce S. Davie, Adrian Farre, **Wireless Networking Complete**, 1, Morgan Kaufmann-Elsevier, 2010

Kaveh Pahlavan, Prashant Krishnamurthy, **Networking Fundamentals: Wide, Local and Personal Area Communications**, 1, Wiley and Sons, 2009

Kevin Townsend, Carles Cufí, Akiba, Robert Davidson, **Getting started with Bluetooth Low Energy**, 1, O'Reilly, 2014

Complementary Bibliography

James F. Kurose, Keith W. Ross, **Computer Networking: A Top-Down Approach**, 7, Pearson Education, 2017

Recommendations