Universidade Vigo

IDENTIFYING DATA
Wireless and Mobile Communications

Subject	Wireless and Mobile Communications			
Code	V05M145V01313			
Study programme	Telecommunication Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Optional	2nd	1st
Teaching language	English			
Department				
Coordinator	Vazquez Alejos, Ana			
Lecturers	Pérez Fontán, Fernando Vazquez Alejos, Ana			
E-mail	analejos@uvigo.es			
Web	http://http://faitic.uvigo.es			
General description	This subject introduces the student in the technology of the main present mobile and wireless communication systems, with training in analysis of coverage and quality planning at radio interface level.			

Competencies

Code
C20 CE20/RAD3 Ability to analyse and specify the basic parameters of a mobile or wireless radio network, as well as of quality of service.

Learning outcomes

Expected results from this subject	Training and Learning Results
Know the reference architectures of the 2G/3G/4G cellular systems, and also for short range radio systems and standards: WLAN, WPAN and others.	C20
Ability to compute the coverage and capacity of a mobile communications site and estimate the cellular radius.	C20
Dimensioning and capacity planning of mobile and wireless systems.	C20
Ability to carry out a mobile network deployment planning.	C20
Ability to select the radio technology most appropriate to a given application.	C20

Contents

Topic	
Unit 1. Overview of mobile, cellular, WLAN, WPAN, and other wireless radio communication systems.	1.1. Introduction to mobile and wireless systems. 1.2. Mobile and wireless radio propagation channel.
Unit 2. Dimensioning and quality of service planning in mobile and wireless radio systems.	2.1. The cellular concept. 2.2. Cellular design fundamentals. 2.3. Dimensioning of a mobile radio system. 2.4. Quality of service.
Unit 3. Review of the standards of current cellular systems.	3.1. 2G mobile phone systems: GSM and GPRS. 3.2. 3G mobile phone systems: CDMA, UMTS, 3G, 3G+. 3.3. Next Generation Mobile phone systems: LTE 5G. 3.4. Security vulnerability in mobile communications systems.
Unit 4. Review of the standards of current wireless systems.	4.1. Introduction to wireless systems and services: WLAN, WPAN, BAN. 4.2. Design fundamentals: dimensioning and quality of service. 4.3. Security vulnerability in wireless communications systems.

Planning

	Class hours	Hours outside the classroom	Total hours
Master Session	22	22	44
Case studies / analysis of situations	4	40	44
Troubleshooting and / or exercises	4	2	6
Autonomous troubleshooting and / or exercises	0	10	10
Short answer tests	0	1	1
Practical tests, real task execution and / or simulated.	0	10	10
Self-assessment tests	0	10	10

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

Methodologies

	Description
Master Session	Presentation of the contents of the subject by teachers; it includes explaining the theoretical concepts; introduction of lab practices, on-line tests and exercises/problems of autonomous realisation.
Case studies / analysis of situations	Conducting case studies in laboratory with delivery of a memory/report to be assessed.
Troubleshooting and / or exercises	Resolution of problems and/or exercises in ordinary classroom.
Autonomous troubleshooting and / or exercises	Solving by the student of problems related with the subject applied to specific cases. The student must develop the analysis and resolution of the problems in an autonomous form. These exercises are proposed weekly in attendance hours and they are guided by the professor on the resolution.

Personalized attention

Methodologies	Description
Master Session	Time scheduled by professors to attend and resolve doubts of the students.
Autonomous troubleshooting and / or exercises	Time that the lecturer of group A will use to attend the students that need some support in doing their autonomous work.
Case studies / analysis of situations	Time scheduled to help the students in preparing their work.
Troubleshooting and / or exercises	Time that the lecturer can use to help the students in preparing their work.

Tests	Description
Short answer tests	Time that the lecturer can use to help the students in preparing their tests.
Practical tests, real task execution and / or simulated.	Time to be used by professors to help the students to understand the lab practices and to resolve doubts.
Self-assessment tests	Time that the lecturer can use to help the students in preparing their tests.

Assessment

	Description	Qualification	Training and Learning Results
Autonomous troubleshooting and / or exercises	It will evaluate the resolution of problems delivered to each student for troubleshooting in an autonomous form.	15	C20
Short answer tests	Final examination consists of a multiple choice test for assessing the skills acquired by students by solving simple problems and questions of theory. This test includes closed questions with different alternative of answer. Students select an answer from a limited number of possibilities.	35	C20
Practical tests, real task execution and / or simulated.	For each lab practice (case studies / analysis of situations) an individual report of results must be presented for assessment.	35	C20
Self-assessment tests	Multiple choice questions tests for each unit of the subject content. The questionnaires are performed through Faitic platform that shows the results after completing each test. Students perform the tests in an autonomous form, and indications are given during attendance and office hours.	15	C20

Other comments on the Evaluation

According to the specific guidelines of the degree, students enrolled in the subject can choose one of the two proposed

assessment systems: continuous assessment or final evaluation.

Continuous assessment

Continuous assessment involves performing throughout the semester of the paragraphs disaggregated in the above table. Each of the blocks is of mandatory fulfillment in the form of continuous and individual assessment, and to pass the subject a minimum of 1/3 of the note assigned to each of the sections and the final mark accumulated within the five sections to be achieved must overcome at least 50% of the final grade.

The short answer test is multiple choice and is done the day indicated in the official exam schedule. Regarding the block of laboratory practices, one report is required per practice and per student, made in a individual way. Evidences of report copying or cloning will drive to fail the related practice.

Continuous assessment involves making 100% of all proposed tasks: active participation in the sessions of classroom and laboratory practices, autonomous work as solving exercises and online/in-class self-assessment tests (questionnaires), and performing the final short answer test.

These tasks are not recoverable, that is, if a student does not satisfy the stipulated timing the teacher has no obligation to repeat, and also they will be only valid for the academic year in which they are made.

Evaluation by final exam

In compliance with the regulations of the University of Vigo, a student who does not opt for continuous assessment should be eligible for the highest rating by the final exam, which will consist of three parts:

> - Part 1: realization of laboratory practices and delivery of reports due (35% of the final grade). One report is required per practice and per student, made in a individual way. Evidences of report copying or cloning will drive to grade as zero the related practice.
>
> - Part 2: test exam (50% of the final grade).
>
> - Part 3: troubleshooting (20% of the final grade).

It is considered that the subject is passed if the final grade is equal to or greater than 5.

Extraordinary exam (July)

For students who followed the continuous assessment, those ones who want to retain the mark obtained in the first part of the continuous assessment (70%) may choose to perform only the test (30%) provided they have exceeded the minimum requirement in each block .

For students who chose the final evaluation, the note will be the final exam that will consist of three parts: a practical examination (pass /non-pass), a standard test exam (50%) and an examination of problems (50%) .

It is considered that the subject is approved if the final grade is equal to or greater than 5.

Sources of information
Basic Bibliography
Ana Vazquez Alejos, **Lecture Notes and Powerpoint Slides**, 2017,
Oriol Sallent, **Fundamentos de diseño y gestión de sistemas de comunicaciones móviles celulares**, 2014,
Complementary Bibliography
Jose María Hernando Rábanos, **Comunicaciones Móviles**, 2004,
Mª Teresa Jiménez Moya, Juan Reig Pascual, Lorenzo Rubio Arjona, **Problemas de comunicaciones móviles**, 2006,
José Manuel Huidobro Moya, **Comunicaciones móviles : sistemas GSM, UMTS Y LTE**, 2012,
Qualcomm, 2014,
Martin Sauter, **From GSM to LTE: An Introduction to Mobile Networks and Mobile Broadband**, 2011,
Maciej Stasiak et al., **Modelling and Dimensioning of Mobile Wireless Networks: From GSM to LTE**, 2010,
W. Dargie, C. Poellabauer, **Fundamentals of Wireless Sensor Networks: Theory and Practice**, 2010,

Recommendations
Subjects that continue the syllabus
Antennas/V05M145V01208
Radio Laboratory/V05M145V01209

Wireless Networks and Ubiquitous Computation/V05M145V01211
Satellites/V05M145V01311
Communication Advanced Systems/V05M145V01302

Subjects that it is recommended to have taken before

Radiocommunication/V05M145V01103