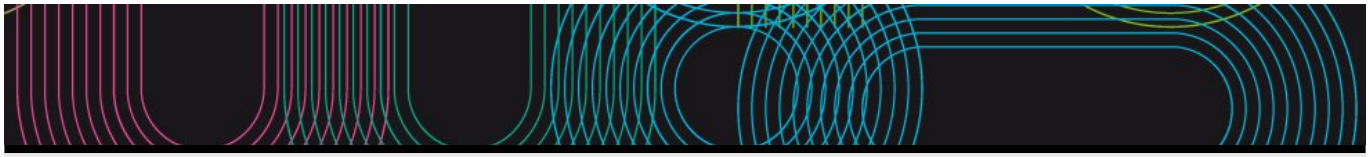
Universidade Vigo

Subject Guide 2015 / 2016



IDENTIFYING DATA				
(*)Sistemas Avanzados de Comunicacións				
Subject	(*)Sistemas Avanzados de Comunicacións			
Code	V05M145V01302			
Study programme	(*)Máster Universitario en Enxeñaría de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Optional	2nd	1st
Teaching language	English			
Department				
Coordinator	Mosquera Nartallo, Carlos			
Lecturers	Mosquera Nartallo, Carlos			
E-mail	mosquera@gts.uvigo.es			
Web				
General description	This course covers the application of advanced mathematical tools to address some challenges in new and emerging satellite and terrestrial communication systems, with special emphasis on lower layers and system considerations.			

Competencies	
Code	
B4	CG4 The capacity for mathematical modeling, calculation and simulation in technological centers and engineering companies, particularly in research, development and innovation tasks in all areas related to Telecommunication Engineering and associated multidisciplinary fields.
C22	CE22/PS2 Ability to understand the impact of the requirements of the telecommunications systems design services, with special emphasis in the lower layers, while maintaining a global vision of the solutions employed in modern commercial systems of communications.

Learning outcomes	
Expected results from this subject	Training and Learning Results
Understand the impact of telecommunication services requirements on system design, with special emphasis on lower layers.	B4 C22
Acquire a global view of the solutions developed for modern commercial communication systems.	B4 C22

Contents	
Topic	
1. Convex optimization	1.1 Fundamentals of convex optimization 1.2 Lagrange duality 1.3 Network utility maximization
2. Multiple-access channels	2.1 Capacity regions 2.2 Random access schemes
3. Random matrices	3.1 Principles of random matrix theory 3.2 Applications in communications engineering

Planning			
	Class hours	Hours outside the classroom	Total hours
Seminars	10	30	40
Troubleshooting and / or exercises	0	20	20

Master Session	18	45	63
Short answer tests	2	0	2

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

Methodologies

	Description
Seminars	Different communication systems, ranging from satellite to maritime scenarios, will be presented with special emphasis in those challenges which are at the core of modern solutions and require advanced mathematical tools.
Troubleshooting and / or exercises	Every week a homework challenge will be proposed to be solved with the aid of mathematical analysis, software tools or both.
Master Session	Advanced mathematical tools will be introduced as background material to address practical solutions in modern communication systems.

Personalized attention

Methodologies	Description
Master Session	The instructor will be available during his regular office hours.
Seminars	The instructor will be available during his regular office hours.
Troubleshooting and / or exercises	The instructor will be available during his regular office hours.

Assessment

	Description	Qualification	Training and Learning Results	
Troubleshooting and / or exercises	Every week a homework challenge will be proposed to be solved with the aid of mathematical analysis, software tools or both. If the solution is not turned in within the allocated deadline, the corresponding assignment will not be graded.	40	B4	C22
Short answer tests	Final exam with short questions and exercises.	60	B4	C22

Other comments on the Evaluation

The students need to obtain 50 out of 100 points to pass the course. In addition, a minimum grade of 30% is required in the final exam.

The grades obtained from the weekly assignments are only valid for the current academic year, and cannot be redone after the corresponding deadline. A student can decide to opt out the evaluation of the weekly assignments; in such a case, his/her final score will be fully based on the final exam. This applies also to the second call. Once the student turns in any of the deliverables, he/she will be considered to be following the continuous evaluation track.

Any student that chooses the continuous evaluation track will get a final score, regardless of her/his taking the final exam.

All the homeworks and exam will be given in English.

Sources of information

Books:

Dimitri P. Bertsekas, "Convex Optimization Theory", Athena Scientific, 2009.

Stephen Boyd, Lieven Vandenberghe, "Convex Optimization", Cambridge University Press, 2004.

Papers will be also recommended during the course.

Recommendations

Subjects that it is recommended to have taken before

(*)Comunicacións Dixitais Avanzadas/V05M145V01204

Other comments

Attendance to physical classes is mandatory. If a minimum 80% attendance is not fulfilled, the grade will be entirely based on the final exam.