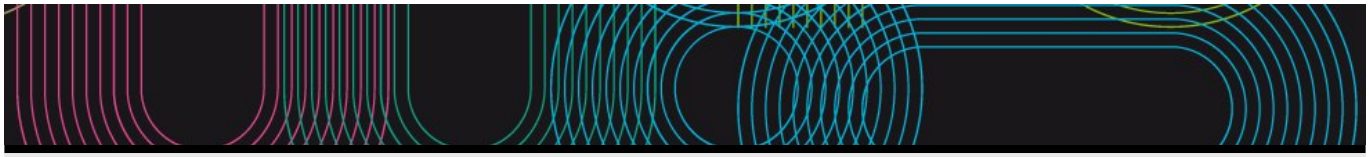

IDENTIFYING DATA				
Multimedia Communications				
Subject	Multimedia Communications			
Code	V05M145V01206			
Study programme	Telecommunication Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Optional	1st	2nd
Teaching language	English			
Department				
Coordinator	Comesaña Alfaro, Pedro			
Lecturers	Comesaña Alfaro, Pedro			
E-mail	pcomesan@uvigo.es			
Web				
General description	In the subject "Multimedia Communications" information theory basic concepts are presented. Then, lattices are presented as both source coding and channel coding tools. After commenting some generalities about another source coding strategy, namely Trellis Code Quantization, more advanced coding problems, as distributed source coding and joint source-channel coding, are considered.			

Competencies	
Code	
B1	CG1 Ability to project, calculate and design products, processes and facilities in telecommunication engineering areas.
B4	CG4 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.
C1	CE1 Ability to apply methods of information theory, adaptive modulation and channel coding, as well as advanced techniques of digital signal processing systems and audiovisual communications.
C4	CE4 Ability to design and plan networks for transporting, broadcasting and distribution of multimedia signals.
C6	CE6 Ability to model, design, implement, manage, operate, and maintain networks, services and contents.
C8	CE8 Ability to understand and know how to apply the operation and organization of the Internet, new generation Internet technologies and protocols, component models, middleware and services.

Learning outcomes	
Expected results from this subject	Training and Learning Results
Understanding the fundamental characterisitcs of a lattice, and the properties we must take into account when facing a source coding problem and a channel coding problem.	B4 C1
Understand that a trellis code defines a lattice and why this construction is useful for source coding (Trellis-Code Quantization)	B4 C1
Understanding of the different distributed source coding schemes.	B1 B4 C1 C4 C8
Implementation of a distributed source coding scheme.	B1 B4 C1 C6 C8
Understading of the different schemes of joint source and channel coding.	B4 C1 C4 C6 C8

Implementation of a joint and source channel coding scheme.	B1 B4 C1 C4 C6
Understanding of the characteristics of different ways of multimedia signal distribution, paying special attention to streaming schemes.	B1 C4 C6 C8
Asessment of the modularity of new video coding standards (e.g., MPEG-7)	B1 C4 C6 C8

Contents

Topic	
1) Information theory.	1) Discrete case: Entropy. Conditional entropy. Joint entropy. Mutual information. Kullback-Leibler Divergence. 2) Continuous case: Entropy. Conditional entropy. Joint entropy. Mutual information. Kullback-Leibler Divergence. 3) Jensen's inequality. 4) Shaping gain.
2) Lattices	1) Definition 2) Basic properties
3) Advanced source coding	1) Lloyd-Max quantizer. 2) Trellis Code Quantization.
4) Distributed source coding	1) Lossless coding 2) Lossy coding
5) Joint source-channel coding	1) Shannon's separability principle 2) JSCC practical examples

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practises	13	44	57
Master Session	15	30	45
Reports / memories of practice	0	21	21
Long answer tests and development	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
Laboratory practises	13 hours of PC lab. Programming of computational simulations. The student will simulate, by using a numerical calculus programming language (as Matlab) the multimedia communications systems introduced in this subject. Competencies: CG1, CG4, CE1, CE4, CE6, CE8.
Master Session	15 hours of theoretical lessons, where practical cases will be introduced. Furthermore, autonomous homework exercises will be proposed. Competencies: CG1, CG4, CE1, CE4, CE6, CE8.

Personalized attention

Tests	Description
Reports / memories of practice	Individual feedback on the reports will be provided.

Assessment

	Description	Qualification	Training and Learning Results	
Laboratory practises	Numerical simulation programming.	30	B1 B4	C1 C4 C6 C8

Reports / memories of practice	Report on lab practises and reports on related topics.	10	B1	C1 C4 C6
Long answer tests and development	Final exam.	60	B1 B4	C1 C4 C6

Other comments on the Evaluation

In order to do the weighted average of the different qualifications (corresponding to continual assessment), the student should submit all the mentioned tasks. Furthermore, a minimum mark of 40% should be achieved in the final exam, and a minimum mark of 40% should be achieved in the lab practice. In case that those thresholds were not achieved, the final mark will be the minimum of the final exam mark and the lab mark (both of them over 10 points)

All the tests, practices and reports will be done individually.

Those student who choose to be evaluated by final assessment will have to do the final exam (based on long answer and development questions), as well as a practical exam; the complexity of the latter will be similar to the work done by the continuous assessment students.

The same rules are applied to the second call.

Plagiarism/copy in any of the tasks described above implies automatic failure.

Sources of information

Basic Bibliography

Cover and Thomas, **Elements of information theory**, Wiley,

Complementary Bibliography

Artículos científicos especificados por el profesorado,

Recommendations

Subjects that it is recommended to have taken before

Signal Processing in Communications/V05M145V01102

Other comments

Even if this subject has not a series of mandatory prerrequisites, it is highly recommended that the student has a minimal background on:

- Statistics.
- Signal Processing.
- Channel coding.
- Source coding.
- Internet networks and protocols.