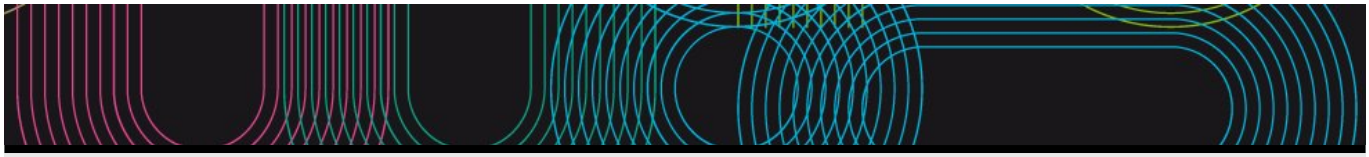

IDENTIFYING DATA				
Multimedia Communications				
Subject	Multimedia Communications			
Code	V05M145V01206			
Study programme	Máster Universitario en Ingeniería de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Optional	1st	2nd
Teaching language	English			
Department				
Coordinator	Comesaña Alfaro, Pedro			
Lecturers	Comesaña Alfaro, Pedro			
E-mail	pcomesan@gts.uvigo.es			
Web	http://moovi.uvigo.gal/			
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.			

Training and Learning Results	
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.

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 practical	13	55	68
Lecturing	14	40	54
Problem and/or exercise solving	1	0	1
Problem and/or exercise solving	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 practical	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: B1, B4, C1, C4, C6, C8. Software to be used: Matlab.
Lecturing	14 hours of theoretical lessons, where practical cases will be introduced. Furthermore, autonomous homework exercises will be proposed. Competencies: B1, B4, C1, C4, C6, C8.

Personalized assistance	
Methodologies	**Description**
Laboratory practical	Personalized assistance will be provided at the office hours. Individual feedback on the reports will be provided. The schedule of the office hours can be checked at the institutional website of the subject instructor: https://www.uvigo.gal/es/universidad/administracion-personal/pdi/pedro-comesana-alfaro
Lecturing	Personalized assistance will be provided at the office hours.

Assessment

	Description	Qualification	Training and Learning Results	
Laboratory practical	Numerical simulation programming, including the analysis of the obtained results and report/s writing.	40	B1 B4	C1 C4 C6 C8
Problem and/or exercise solving	Midterm exam.	20	B1 B4	C1 C4 C6
Problem and/or exercise solving	Final exam.	40	B1 B4	C1 C4 C6

Other comments on the Evaluation

- Continuous assessment: In order to do the weighted average of the different qualifications, the student should submit all the tasks (practical work/s with report, midterm exam and final exam.) Moreover, at least 40% of the maximum grade must be obtained in the final exam and 40% of the maximum grade in each practical work. In case that these thresholds are not reached, the final grade will be the minimum of the weighted grade (using the weights indicated in the previous table) and 4.

- Global assessment: In order to do the weighted average of the different qualifications, the student should submit all the tasks (practical work/s with memory, and final exam.) Moreover, at least 40% of the maximum grade must be obtained in the final exam and 40% of the maximum grade in each practical work. In case that these thresholds are not reached, the final grade will be the minimum of the weighted grade (with a weight of 40% for the practical work/s and 60% for the final exam) and 4.

All the exams/test and practical works will be done individually and they can not be recovered.

The schedule of the midterm exams and the delivery of practical work/s will be published in a shared calendar and will be available at the beginning of each academic semester.

After the publication of the grades of the midter exam the students will have a one-month period to resign continuous assessment.

The same rules will be applied to the second call, where the students will choose if they keep the qualification of the midterm exam and are assessed with continuous assessment, or if they prefer to be assessed by global assessment. The grade of the midterm exam will not be saved for subsequent years.

In case of early call, the assessment will be performed by final exam only.

Plagiarism is regarded as serious dishonest behavior. If any form of plagiarism or extensive use of AI tools 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

Cover and Thomas, **Elements of information theory**, 2, Wiley, 2006

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.