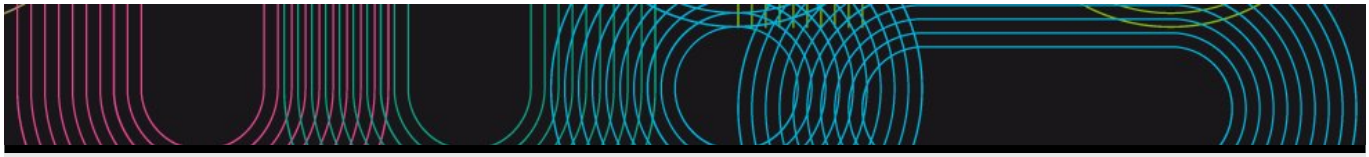

IDENTIFYING DATA				
Signal Processing in Audiovisual Systems				
Subject	Signal Processing in Audiovisual Systems			
Code	V05M145V01205			
Study programme	Telecommunication Engineering			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	5	Optional	1st	2nd
Teaching language	English			
Department				
Coordinator	Martín Rodríguez, Fernando			
Lecturers	Martín Rodríguez, Fernando			
E-mail	fmartin@uvigo.es			
Web	http://http://faitic.uvigo.es			
General description	In this course we will describe the main compression and coding tecniques for audiovisual signals, paying special attention to MPEG4 standard. We will also explain the main characteristics of MPEG-7 standard for multimedia content description and retrieval.			

Competencies	
Code	
B1	CG1 The ability to project, calculate and design products, processes and facilities in telecommunication engineering areas.
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.
C1	CE1 The 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.

Learning outcomes	
Expected results from this subject	Training and Learning Results
Learning to exploit perceptual effects and spatial/temporal redundancy to compress audiovisual information.	B1 B4 C1
Understanding information structure into the MPEG4 standard and the reasons because it is needed.	B1
Understanding main processes applied on audio and video signals to guarantee perceptual quality while reducing bitrate. Knowledge of the main algorithms that are part of standards.	B1 B4 C1
Learning to handle audiovisual information to extract metadata and to use them in indexing and retrieval.	B1
Understanding strcuture and usefulness of MPEG7 standard.	B1

Contents	
Topic	
Introduction to audiovisual compression and coding.	Human perception, redundancy and importance. Compression standards history. Analysis and description of spatial/temporal video structure.
Video coding.	Video compression standards: MPEG 1, 2 & 4; H.261, H.263, H.264 (AVC).
Audio coding.	Audio compression estandards: MPEG 1, 2, 4 (MP3, AAC).
Advanced audiovisual description.	MPEG7. Advanced audiovisual description. Multimedia content management. Information retrieval.

Planning

	Class hours	Hours outside the classroom	Total hours
Practice in computer rooms	10	30	40
Tutored works	10	50	60
Master Session	8	8	16
Multiple choice tests	1	0	1
Reports / memories of practice	1	7	8

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

Methodologies

	Description
Practice in computer rooms	Working specific concepts from the theory (master) sessions. We will use computer tools. Related competencies: CG1, CG4, CE1.
Tutored works	Work about the explained concepts, sometimes going beyond. Normally, works are initiated in computer lab work and it will spread over more than one week. Students (in pairs), have to discover (on their own or with teacher assistance) what they need to solve the problem. Results (or at least, part of them) will be presented in public. Related competencies: CG1, CG4, CE1.
Master Session	Basic concepts exposition. Related competencies: CG1, CG4, CE1.

Personalized attention

Methodologies	**Description**
Practice in computer rooms	Querry and answer in the classroom and, if necessary, appointment for office work. Query and answer via e-mail.
Tutored works	Querry and answer in the classroom and, if necessary, appointment for office work. Query and answer via e-mail.
Master Session	Querry and answer in the classroom and, if necessary, appointment for office work.
Tests	**Description**
Reports / memories of practice	Answer to questions on writing them. In assessment, a brief report with correct issues and and errors is sent.

Assessment

	Description	Qualification	Training and Learning Results	
Multiple choice tests	These tests are based on theory classes concepts.	20	B1 B4	C1
Reports / memories of practice	The qualification of guided works comprises: achievemnts, documentation, bibliography selection and oral presentation. Normally individual work. If team work is done, presentation qualification can be different.	80	B1 B4	C1

Other comments on the Evaluation

There will be a final exam for those students that did not pass under the continuous assesment, the date will be scheduled by the school officials. Students are also allowed to go directly to the final exam skipping all continuous assesment activities.This exam will be assesed between 0 and 10 and includes all concepts in theory classes and also the techniques being explained commonly for the guided works. To pass, students must achieve a minimum of 5 points.

Extraordinary exam in July will consist of another exam for students failing to pass in may (after continuous evaluation and final exam). This new exam will be governed by the same rules of final exam in may.

Sources of information

Fernando Pereira and Touradj Ebrahimi, **The MPEG-4 book**, MSC Press Multimedia Series, Pearson Education,

Thiagarajan, Jayaraman, **Analysis of the MPEG-1 Layer III (MP3) Algorithm using MATLAB**, Morgan & Claypool,

Richardson, Iain E. G., **H.264 and MPEG-4 video compression: video coding for next generation multimedia**, Wiley, cop.,

There exists written material by professor (slides) that will be used in class and made avaliable via faitic in PDF format.

Recommendations

Subjects that are recommended to be taken simultaneously

Multimedia Communications/V05M145V01206

Subjects that it is recommended to have taken before

Signal Processing in Communications/V05M145V01102