Universida_{de}Vigo

IDENTIFYING DATA
Fundamentals of Sound and Image

Subject	Fundamentals of Sound and Image				
Code	V05G300V01405				
Study programme	Degree in Telecommunications Technologies Engineering				
Descriptors	ECTS Credits		Choose	Year	Quadmester
	6		Mandatory	2nd	2nd
Teaching language	Spanish				
Department	Signal Theory and Communications				
Coordinator	Martín Rodríguez, Fernando				
Lecturers	Martín Rodríguez, Fernando Martínez Solís, Diego Pena Giménez, Antonio Rodríguez Rodríguez, José Luis				
E-mail	fmartin@uvigo.es				
Web	http://faitic.uvigo.es				
General description	"Fundamentos de Sonido e Imagen" presents the basic concepts of sound and image, as well as the processes operating over the audiovisual signals.				

Competencies

Code	
B3	CG3: The knowledge of basic subjects and technologies that enables the student to learn new methods and technologies, as well as to give him great versatility to confront and adapt to new situations
B5	CG5: The knowledge to perform measurements, calculations, assessments, appraisals, technical evaluations, studies, reports, task scheduling and similar work to each specific telecommunication area.
C13	CE13/T8: The ability to understand the electromagnetic and acoustic wave mechanisms of propagation and transmission, and their corresponding receiving and transmitting devices.
D3	CT3 Awareness of the need for long-life training and continuous quality improvement, showing a flexible, open and ethical attitude toward different opinions and situations, particularly on non-discrimination based on sex, race or religion, as well as respect for fundamental rights, accessibility, etc.

Learning outcomes

Expected results from this subject	Training and Learning Results	
Analysing the basic properties of the sound.	C13	D3
Explaining different sound production systems: human sound production, musical instruments, machines and other vibrant systems.	C13	D3
Interpreting results of acoustic measures and selecting tools for the appropriate analysis.	B5	D3
Describing the human perception of sound based on the physiological interface and the psychology of the perception.	C13	D3
Reviewing diffrent processes and systems associated to the sound production	B3 B5	D3
Applying the basic rules of the colorimetry.	B3	D3
Analysing lens systems.	B3 B5	D3
Choosing the most suitable capture and presentation image sytems.	B3 B5	D3
Choosing the most adapted formats for image and video.	B3 B5	D3
Relating the influence of the coding parameters with the results of compression and quality.	B3 B5	D3

Contents

Topic	
S1. Sampling & Quantization.	
S2. Sound: time and frequancy domain analysis.	-Time domain characteristics. -Windowing and DFT. -Frequancy Characteristics. -Sound: acoustic variables, generation, sources combination, sound sensations.
S3. Measuring sound.	- Measurement levels. - Sonometer. - Filter banks. - Sound acquision. - Especifications and objective quality.
I1. Colorimetry	Fiixed image signals and video signals. Visual human system. Light and colour. Visual effects.
I2. Capture and representation of images	Cameras and lens. Monitors. 3D Visualisation.
I3. Image and video coding	Fixed image: format of colour YUV; standards of compression. Image in movement: H.261 standard; MPEG formats.
Projects S1 and S2. Sound analysis.	Time, frequency and spectrograms.
Projects S3 and S4. Sound measurements	Sound pressure level. Sonometer. Octave-filter banks
Project I1. Colorimetry	Basic functions
Project I2. Still images coding.	Practical work about still image coding.
Project I 3. Video coding	Practical work about motion image coding.

Planning

	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0	1
Lecturing	25	50	75
Problem solving	6	12	18
Computer practices	19	19	38
Discussion Forum	0	1	1
Objective questions exam	0	2	2
Essay questions exam	4	0	4
Short answer tests	1	0	1
Practices report	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
Introductory activities	Course presentation: programme, reading materials, teaching methodology and assessment system. Developed capabilities: CG3, CG5, CE13, CT3.
Lecturing	Instructor presentation of the main concepts of each subject. The student should take the contents of the guiding documents provided for each section. Student will work alone afterwards on the concepts studied in class and on expanding this content using the documents provided for each subject. Identification of doubts that need to be resolved in personalized tutorials. Developed capabilities: CG3, CG5, CE13, CT3.
Problem solving	Problems and exercises formulated according to the content of the lectures and the documents for each subject. Students solve problems and exercises prior to the class. Identification of doubts that need to be resolved in personalized tutorials. Developed capabilities: CG3, CG5, CE13, CT3.
Computer practices	Handling of analysis tools and algorithms. Identifying which one must to be used to solve each specific problem. Identification of doubts that need to be resolved in personalized tutorials. Developed capabilities: CG3, CG5, CE13, CT3.

Discussion Forum	The website for the course is included in the TEMA platform (http://faitic.uvigo.es). Subscription to this platform, including a photograph, is mandatory. The website provides all the information related to the course. It also publishes continuous assessment grades and runs forums for students to exchange ideas and discuss doubts. Developed capabilities: CG3, CG5, CE13, CT3.	

Personalized attention

Methodologies	Description
Problem solving	Help with problem solving, in the classroom and/or at the office.
Computer practices	Help in the classroom and, if necessary at the office or via e-mail.
Lecturing	Querry and answer in the classroom and, if necessary, at the office.

Tests	Description
Practices report	Querry and answer about report writing. Report correction consists in a brief remark being sent to students (via faitic).

Assessment

	Description	Qualification	Training and Learning Results	
Objective questions exam	On the faitic website.	7.5	B3	
Essay questions exam	To evaluate theoretical knowledge and problem resolution.	65	B3 B5	C13
Short answer tests	Exam with questions and problems.	5	B3	
Practices report	Report about the work perfomed during several weeks in the computer classroom. This is the only methodology where team work is assessed (teams of two). The qualification is the same for both students.	22.5	B5	

Other comments on the Evaluation

On detecting any kind of plagiarism in any of the tests (short test, partial or final exam, lab reports) the final qualification will be FAIL (0) and the fact will be transmitted to school regents for taking the appropriate actions.
There are two kinds of assesment: continuous assesment and single assesment.

The schedule for intermediate evaluation tests will be approved by the CAG (DEGREE ACADEMIC COMMITTEE) and will be published at the beginning of four month period in which this course is delivered.

CONTINUOUS ASSESSMENT

The continuous assessment consists of several activities. If the student can not do them in the fixed date, this activity will not be evaluated. The grades of these activities will be valid only for the present academic course.
If the student sits for "Exam 1", she/he will be evaluated by continuous assessment. Furthermore, once the student has taken this exam, she/he will be considered to have attended this examination call. Qualification will be computed using the following criteria with no consideration if she/he takes the final exam or not.

Types and assessment of activities:

1. Exam 1 (Weight: 15%): It includes the subjects explained until this week.
2. Tests (Weight: 7.5%): developed along the course on the faitic website.
3. Exam of practices (Weight: 7.5%).
4. Short answer exam (Weight: 5%): It includes several subjects.
5. Lab project report (Weight: 15%).
6. Exam 2 (Weight: 50%): on the date of the final exam. It includes all the subjects, except those evaluated in the Exam 1 and the contents of lab projects.

In order to ensure that students acquire a balanced minimum on the subject competences, they will pass the course if they meet these two conditions:

1) get a final mark equal to or greater than 5 (on a ten-points scale)

2) and a score equal to or greater than 3.5 (on a ten-points scale) in each one of these two sets:

* assessment of sound-related scores

* assessment of image-related scores

If this second condition is not fullfilled, although global mean is equal or greater than 5, qualification will be stated in the records as "fail" (4).

SINGLE EXAM ASSESSMENT

Students will be evaluated by means of an only exam, in the official date, if they don't do the Exam 1. The grades for this final exam are between 0 and 10 points. It includes all the subjects of the course, including the laboratory works.

In order to ensure that students acquire a balanced minimum on the subject competences, they will pass the course if they meet these two conditions:

1) get a final mark equal to or greater than 5 (on a ten-points scale)

2) and a score equal to or greater than 3.5 (on a ten-points scale) in each one of these two sets:

* assessment of sound-related scores

* assessment of image-related scores

If this second condition is not fullfilled, although global mean is equal or greater than 5, qualification will be stated in the records as "fail" (4).

Student can do the activities of Continuous Assessment, except the Exam 2.

Second opportunity exam:

⇒ **Students evaluated by Continuous Assessment in the first opportunity can opt between two possibilities the same day of the exam:**

1. Do again the Exam 2 and be evaluated according what is stipulated for the system of Continuous Assessment.
2. Be evaluated with a single final exam in the official date assigned by the Centre. The grades for this final exam are between 0 and 10 points. It includes all the subjects of the course, including the laboratory works. Non Continuous Assessment rules apply.

⇒ **Studentss not evaluated by Continuous Assessment:**
The grades for this final exam are between 0 and 10 points. It includes all the subjects of the course, including the laboratory works. Non Continuous Assessment rules apply. No other activities are assessed.

Special Exam:

In special call exam (end of degree), we will proceed as in the case of students that have not completed the continous assesment.

Sources of information
Basic Bibliography
Finn Jacobsen et al., **FUNDAMENTALS OF ACOUSTICS AND NOISE CONTROL**, Technical University
R. J. Clarke, **Digital Compression of Still Images and Video**, Academic Press.
Complementary Bibliography
Lawrence Kinsler, Austin Frey, Alán Coppens, James Sanders, **FUNDAMENTALS OF ACOUSTICS**, John Wiley & son
T. Perales Benito, **Radio y Televisión Digitales: Tecnología de los Sistemas DAB, DVB, IBUC y ATSC**, Creaciones Copyright
Ulrich Reimers, **DVB : the family of international standards for digital video broadcasting**, Springer

Recommendations
Subjects that continue the syllabus
Room Acoustics/V05G300V01635
Fundamentals of Acoustics Engineering/V05G300V01531
Fundamentals of Image Processing/V05G300V01632

Sound Processing/V05G300V01634
Audio Systems/V05G300V01532
Imaging Systems/V05G300V01633
Audiovisual Technology/V05G300V01631
Video and Television/V05G300V01533

Subjects that are recommended to be taken simultaneously
Signal Transmission and Reception Techniques/V05G300V01404

Subjects that it is recommended to have taken before
Physics: Fields and Waves/V05G300V01202
Physics: Fundamentals of Mechanics and Thermodynamics/V05G300V01102
Digital Signal Processing/V05G300V01304
Electromagnetic Transmission/V05G300V01303