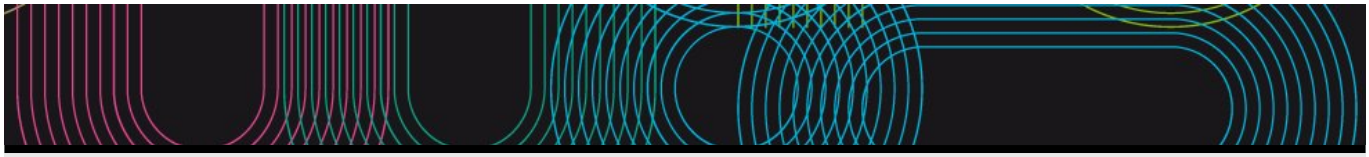

IDENTIFYING DATA				
Interactive Audio Systems				
Subject	Interactive Audio Systems			
Code	V05G301V01331			
Study programme	Grado en Ingeniería de Tecnologías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	3rd	2nd
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Pena Giménez, Antonio			
Lecturers	Pena Giménez, Antonio			
E-mail	apena@gts.uvigo.es			
Web	http://moovi.uvigo.gal			
General description	Interactive systems are discussed, from human perception to user experience and user interfaces, considering audiovisual quality. Interactive sound mixing is revised in comparison to traditional linear sound mixing. A project using a game engine is developed. English Friendly subject, International students may request from the teachers: a) materials and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

Training and Learning Results	
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.
B6	CG6: The aptitude to manage mandatory specifications, procedures and laws.
B9	CG9: The ability to work in multidisciplinary groups in a Multilanguage environment and to communicate, in writing and orally, knowledge, procedures, results and ideas related with Telecommunications and Electronics.
B12	CG12 The development of discussion ability about technical subjects
C34	CE34/SI1The ability to construct, exploit and manage telecommunication services and applications, such as receiving, digital and analogical treatment, codification, transporting and representation, processing, storage, reproduction, management and presentation of audiovisual and multimedia information services.
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.
D4	CT4 Encourage cooperative work, and skills like communication, organization, planning and acceptance of responsibility in a multilingual and multidisciplinary work environment, which promotes education for equality, peace and respect for fundamental rights.

Expected results from this subject	Training and Learning Results

Results of learning (SI1.2): -> Describe sound and image human perception using Physiology and Psychology of Perception. Understand the concept 'quality' in a given audio/image application -> Understand which aspects influence audiovisual quality. -> Understand the basics of spatial audition and vision. -> Know and understand the operation of dynamic range processors and its application in a chain of audio systems. -> Apply equalization techniques and other processes. -> Schedule and carry out a mixture of sounds from the technical point of view, either a linear mix or an event-driven mix in interactive environments. -> Know and understand which properties an user interface must hold, specially related to sound and image. -> Design and develop a virtual environment using a game engine.	B3 B5 B6 B12	C34	D3
Results of learning Organize a working group to carry out a project, including the following: -> technical ability to collect information, interpret technical specifications, discuss several options and select a combination of audio systems. -> Write progress reports, minutes of meetings and a final technical report . -> Technical meetings, discussion of partial results and oral presentation of the final work in front of a demanding audience. -> Adaptation to new environments , internal management roles in the group and dispute resolution. -> Internalize the importance of the human relationship with the client , preserving a fluent contact.	B9 B12	C34	D3 D4

Contents	
Topic	
Virtual environment in a graphic engine.	Graphic engine management. C# programming.
Dynamic range and processes.	Dynamic range. Compressors and expansors. Filtering. Effects.
Mixture of sounds.	Lineal mixture of sounds. Event-controlled sound mixture for interactive systems.
Audiovisual quality.	Quality of sound and image systems. Audiovisual quality
Perception.	Sound and image human perception systems. Hearing and vision in three-dimensional environments.
User interface and User eXperience (UX).	User interface (UI). User eXperience (UX).

Planning			
	Class hours	Hours outside the classroom	Total hours
Practices through ICT	14	10.5	24.5
Studies excursion	0	7	7
Project based learning	7	52.5	59.5
Flipped Learning	0	10	10
Lecturing	19	24	43
Problem and/or exercise solving	2	0	2
Objective questions exam	0	4	4
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies
Description

Practices through ICT	Handle and adjustment of tools of analysis and algorithms, identifying which is appropriate for a given situation. Through this methodology, competencies CT3, CG3 and CE34 are developed.
Studies excursion	Visits to places where the concepts discussed are applied (radio studio, recording studio, etc.). Due to availability and funding. Through this methodology, competency CE34 is developed.
Project based learning	Collaborative work in reduced groups. A complex design with a regular monitoring agenda. Role assignments, working in common, planning, technical reports and oral presentation. Through this methodology, competencies CT3, CT4, CG3, CG12, CG5, CG6, CG9, CE34 are developed.
Flipped Learning	Written and/or audiovisual material is provided to study and prepare an online test. This activity is prior to the master class or practice in computer rooms where doubts will be resolved and challenges will arise. Through this methodology, competencies CG3 and CE34 are developed.
Lecturing	Oral speech, promoting the critical discussion of the concepts. Theoretical bases of algorithms and procedures used to solve problems are presented. Through this methodology, competencies CT3, CG3, CG12, CE34 are developed.

Personalized assistance

Methodologies	Description
Lecturing	Tutoring to solve issues related to master sessions or lab practice is implemented: -> Individually or -> in reduced groups (no more than 2-3 students). E-mail confirmation to match the date of the appointment is needed.
Practices through ICT	Tutoring to solve issues related to master sessions or lab practice is implemented: -> Individually or -> in reduced groups (no more than 2-3 students). E-mail confirmation to match the date of the appointment is needed.
Project based learning	During group projects an individualized tracking of the student is developed. Cross-avaliation within the group and autoavaliation may be used.

Assessment

	Description	Qualification	Training and Learning Results		
Practices through ICT	Work assessment in the computer room.	10	B3	C34	D3
Project based learning	Assessment of different tasks in a collaborative work, developed along the semester, including a written report and oral presentation.	45	B3 B5 B6 B9 B12	C34	D3 D4
Problem and/or exercise solving	Written test with short questions and problems to solve.	35	B3 B12	C34	
Objective questions exam	Automatic corrected online test.	10	B3	C34	

Other comments on the Evaluation

Following the guidelines of the studies, two evaluation systems will be offered to the students inscribed on this subject: continuous assessment (the preferred method, academic activities are linked to this system) and global assessment (not recommended).

*** "Students who choose continuous assessment" conditions:**
A student follows the continuous assessment system if she/he assigns a document that will be delivered and collected after week 4.
If a student has participated in continuous assessment and does not pass the course he/she will receive a grade of fail.

BONUS SYSTEM (used or not depending on the number of students)
* Group: a weekly score of the groups is publicly published. * Individual: a monthly score of the students is privately published.

Up to a maximum of 1.5 points may be added to the final group mark.In no case, this bonus is negative.Details will be given at the beginning of the course.

CONDITIONS TO PASS THE SUBJECT

Once bonus points are added, in order to ensure that students acquire a balanced minimum on the subject competences, they will pass the course if they meet these three conditions:
1) get a final mark equal to or greater than 5 (on a ten-points scale)
2) a score equal to or greater than 4 (on the same scale) in the written exam mark,
3) and a score equal to or greater than 5 (on the same scale), in the collaborative group mark.

If some of these conditions are not fulfilled, then the final grade (on a ten-points scale) will be the minimum between the final mark and the value 4,9.
Time planning of intermediate evaluation exams will be approved by the Comisión Académica de Grado (CAG) and will be available at the beginning of the semester.
*** "Students who choose for global assessment" conditions:**
The possibility of a final examination will be provided to students who do not opt for the continuous assessment.
In order to ensure that students acquire a balanced minimum on the subject competences, they will pass the course if they meet both 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 4 (on the same scale) in each of the sections of the exam. These sections, respectively, correspond with:
* contents included in all activities* project developed in group, including group internals, management, writing of technical reports and oral presentations.
If some of these conditions are not fulfilled, then the final grade (on a ten-points scale) will be the minimum between the final mark and the value 4,9.

--- EXTRAORDINARY EXAM

Two different situations:
=> Students that are evaluated using continuous assessment:
Two options to choose (just before the exam begins):
* repeat the written exam included in the continuous assessment planning an be evaluated under the "Students who choose continuous assessment" conditions, described above.
* be evaluated with the same final exam of students who choose for global assessment, under the "Students who choose for global assessment" evaluation conditions, described above. No other activities are considered.
=> Students who choose for global assessment:
A final examination will be provided to students who do not opt for the continuous assessment, and are evaluated under the "Students who choose for exam-only assessment" conditions, described above. No other activities are considered.

In case of detection of plagiarism in any of the exams or assignments, the final grade will be SUSPENSE (0) and the fact willbe communicated to the management of the Center for the corresponding effects.

Sources of information

Basic Bibliography

Bruce and Jenny Bartlett, **Practical recording techniques**, Ed. 7, Focal press, 2016

George Mather, **Foundations of Sensation and Perception**, Ed. 3, Psychology Press, 2016

Complementary Bibliography

Unity Technologies, **Unity web: API description, tutorials and more. (https://unity3d.com),**,

fmod studio, **fmod web: API description, tutorials and more. (https://www.fmod.com/)**,

Francis Rumsey and Tim McCormick, **Sound and recording**, Ed. 7, Focal press, 2014

Durant R. Begault, **3-D sound for virtual reality and multimedia (https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20010044352.pdf)**, NASA, 1994

Steven M. LaValle, **Virtual Reality (http://vr.cs.uiuc.edu/vrbooka4.pdf)**, Ed. 1, University of Illinois, 2017

Recommendations

Subjects that continue the syllabus

Video games and virtual reality/V05G301V01417

Subjects that are recommended to be taken simultaneously

Design of audiovisual installations/V05G301V01334

Subjects that it is recommended to have taken before

Programming II/V05G301V01110
Fundamentals of Sound and Image/V05G301V01209

Other comments

The use of generative artificial intelligence (GAI) is allowed while carrying out the academic activities of this subject. Its use must be ethical, critical and responsible. When using GAI, any result should be critically evaluated, and any citations or references generated should be carefully verified. Likewise, it is recommended to declare the use of the tools used.