COURSE DATA

Data Subject

Code	36481
Name	Audio systems
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1407 - Degree in Multimedia Engineering	School of Engineering	3	Second term

Subject-matter

Degree	Subject-matter	Character
1407 - Degree in Multimedia Engineering	14 - Gráficos y Audio por Computador	Obligatory

Coordination

Name	Department
COBOS SERRANO, MAXIMO	240 - Computer Science

SUMMARY

"Audio Systems" is a third year course that is part of the body of compulsory courses of the Degree in Multimedia Engineering. It complements other courses of the Degree under the subject "Computer Graphics and Audio" and others related to the production of audiovisual content in the subject "Audiovisual Production", offering a broad perspective of sound engineering and its role in current content creation.

The course is motivated by the major change that sound engineering has experienced with the advent of digital technologies. These have greatly facilitated the access of many users to music recording equipment, unthinkable years ago when the only way to record music was in a professional recording studio. However, new generations of recording devices and the characteristics of today's computers, make it perfectly possible to create a personal recording studio with the capability to make professional-quality productions. The objective of this course is to introduce the student to sound engineering and audio systems related to the capture, recording, processing and reproduction of sound.

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The contents of the course can be grouped into four distinct blocks. The first provides an introduction to the physics of sound and its perception, psychoacoustics and digital audio systems. The second section focuses on electroacoustic systems for the capture and reproduction of sound, reviewing the different transduction principles thereof and providing the student with a comprehensive view of their physical and electrical specifications. The third part is devoted to signal processing systems that accompany the production of audio systems such as dynamic and temporal processors. Finally, students are introduced to the process of content creation, understanding different aspects and techniques related to recording, editing, mixing and mastering audio tracks.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

Mathematics I
Multimedia information
Audiovisual production and editing

OUTCOMES

1407 - Degree in Multimedia Engineering

- G1 - Be able to relate and structure information from different sources and to integrate ideas and knowledge. (RD1393/2007)

- G2 - Have the learning skills needed to undertake further studies or to gain further training with a certain degree of autonomy. (RD1393/2007)

- G3 - Take into account the economic and social context in engineering solutions, be aware of diversity and multiculturalism and ensure sustainability and respect for human rights and equality between men and women.

- G4 - Be able to integrate into working groups and collaborate in multidisciplinary environments and be able to communicate properly with professionals from all fields.

- G5 - Be able to lead working groups properly, respect and appreciate the work of others, take into account the needs of the group and be available and accessible.

- I10 - e able to design and evaluate human-computer interfaces that ensure accessibility and usability of computer systems, services and applications.

- MM1 - Have knowledge and ability to understand essential facts, concepts, principles and theories related to multimedia systems including all the disciplines covered by these systems.

- MM2 - Be able to understand and manage the different technologies involved in multimedia systems, both from the point of view of hardware and electronics and of software.

- MM3 - Be able to implement methodologies, technologies, processes and tools for the professional development of multimedia products in a real context of use by applying the appropriate solutions for each environment.

- MM5 - Know how to apply the theoretical and practical resources to deal with a multimedia application as a whole.

- MM7 - Be able to apply the principles of audiovisual graphic design and communication to multimedia products.

- MM8 - Integrate knowledge of different multimedia technologies to create products that offer global solutions that are appropriate to each context.

- MM9 - Program correctly in the different specific languages of multimedia systems taking into account time and cost restrictions.

- MM10 - Be able to analyse and integrate software components to develop multimedia applications.

- MM11 - Have knowledge and ability to apply the different mechanisms and elements to create both linear and non-linear audiovisual stories according to different production formats, technologies and media.

- MM12 - Know current 2D and 3D graphic systems and their application to multimedia developments.

- MM13 - Know and be able to use the techniques of digital audio and directional audio systems that can be integrated into multimedia applications.

- MM15 - Be able to respond professionally to the requirements at each step of a multimedia production process: show skills for preparing and understanding scripts and communication, graphic design for communication, management of streaming technology, web design and production and post-production processes.

- MM16 - Have theoretical and practical knowledge of the technologies applied to audiovisual media (photography, radio, sound, television, video, film and multimedia).

- MM18 - Know the basic tools available for creating multimedia contents including high-definition video and audio.

- MM21 - Communicate effectively, both in writing and verbally, knowledge, procedures, results and ideas related to ICT and specifically to multimedia, and know their socioeconomic impact.

- MM24 - Be able to design, develop, evaluate and ensure the accessibility, ergonomics, usability and security of multimedia systems, services and applications and of the information that these manage.

- MM28 - Be able to solve problems with initiative, decision-making and creativity and to communicate and transmit the knowledge, abilities and skills of a multimedia engineer.

LEARNING OUTCOMES

This course affects the following fundamental learning outcomes within the subject in which it is located:

16. Encourage and develop the ability to work in groups, dividing the working load into specialized teams.

18. Know the fundamental principles and algorithms for processing, capturing, and broadcasting the audio signal

19. Diagnose and identify the process or processes involved in the failure or bad behavior of an application with audio or its broadcasting.

20. Define applications with audio content according to the characteristics of the systems and equipment for their reproduction.

Further to the above results , this subject also to acquire the following skills and social skills:

- Learn the basics of digital audio and its applications in sound systems.

- Learn the most important professional sound systems equipment: microphones, loudspeakers, signal processors, audio interfaces, etc.

- Recognize and understand the specifications of audio equipment.

- Learn how to setup a personal recording studio.

- Know the basic functions of the software for recording, editing and mixing professional audio.

- Carry out projects related to the capture and playback of sound.

DESCRIPTION OF CONTENTS

1. Fundamentals of acoustics

Physical Acoustics. Physiological acoustics. Architectural acoustics.

2. Spectral analysis of sound

Signals. Types of signals. Fourier analysis. Examples

3. Basic specifications in audio systems

Basic electrical quantities. Use of the decibel. Electric specifications.

4. Capturing and monitoring

Microphones. Loudspeakers. Amplifiers. Cables and connectors.

5. Signal Processors

Dynamics processors. Frequency processors. Delay processors. Synthesis

6. Recording and mixing

Digital audio workstations (DAWs). Home-studios. Microphone techniques. Introduction to mixing and mastering.

7. Spatial audio

Multichannel surround systems. Binaural audio. Current 3D formats.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Laboratory practices	20,00	100
Classroom practices	10,00	100
Development of group work	5,00	0
Development of individual work	5,00	0
Study and independent work	20,00	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	15,00	0
Resolution of case studies	15,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

1) Work at the course:

a) Theory sessions, including short activities for the students.

b) Problem solving sessions, to practice the concepts from the theory sessions.

c) Lab sessions, understanding by means of simulations the most important concepts from the theory sessions.

2) Student's own work:

a) Homework and exposition in class of the solution.

b) Exam preparation.

c) Lab sessions preparation, reading the lab description and the related theoretical concepts.

3) Consulting sessions: A certain number of hours are established each week, which the students can attend in order to solve doubts

EVALUATION

The course evaluation follows a modified conventional approach, not reaching a full continuous-time evaluation. The following items are considered:

Result from the 1st exam (40% of the final mark)

Lab sessions (15% of the final mark)

Homework (15% of the final mark)

Lesson quizzes (30% of the final mark)

At the end of each lesson a quizz will be conducted in class. The quizz will take place the next class day following the end of the lesson, so that students have a chance to prepare it properly. The results obtained throughout the different quizzes are a very important aspect of the evaluation.

For the students who cannot attend the course lessons, an alternative evaluation is proposed, where the attendance is replaced by solving additional homework.

The minimum mark required to pass the course is 5 over 10 in both the partial exam and homeworks. The remaining items are not subjected to a minimum.

To evaluate the attendance, the student needs to attend at least 75% of the course lessons.

In the second evaluation of the course, two options are possible:

- Final exam (70%)

- Partial exam (40%) + Lesson questionnaires (30%)

The student must choose this option before taking the second exam.

In any case, the evaluation will be in agreement with the *Reglament d'avaluació i qualificació de la Universitat de València per a títols de grau i de màster*, adopted in the Consell de Govern session on may 30th, 2017. (ACGUV 108/2017).

REFERENCES

Basic

- Huber, David M. and Runstein, Robert E., Modern Recording Techniques, 8th edition, Focal Press, 2013. ISBN: 0240821572

- Bartlett, Bruce, and Bartlett, Jenny, Practical Recording Techniques: The Step-by-step Approach to Professional Audio Recording, 6th edition, Focal Press, 2012. ISBN: 024082153X

- Ballou, Glen, Handbook for Sound Engineers, 4th edition, Focal Press, 2008. ISBN: 0240809696

Additional

- Toole, Floyd, Sound Reproduction: The Acoustics and Psychoacoustics of Loudspeakers and Rooms, Focal Press, 2008. ISBN: 0240520092

- Davis, Gary and Jones, Ralph, The Sound Reinforcement Handbook, Yamaha, 1988. ISBN: 0881889008