Course guide

320111 - PDA - Digital Audio Processing

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 739 - TSC - Department of Signal Theory and Communications.

Degree: BACHELOR’S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2022  ECTS Credits: 6.0  Languages: Catalan

LECTURER

Coordinating lecturer: IGNASI ESQUERRA LLUCIA

Others:

PRIOR SKILLS

Students are recommended to have successfully passed the course "Signals and Systems".

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
2. AUD: Ability to build, exploit and manage telecommunication services and applications, understood as capture systems, analogue and digital manipulation, coding, transport, representation, processing, storage, reproduction, management and presentation of audiovisual services and multimedia information.

3. AUD: Ability to create, encode, manage, promote and distribute multimedia content, on the basis of the criteria of usability and accessibility of audiovisual services and interactive broadcasts.

Transversal:
1. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

TEACHING METHODOLOGY

Supervised sessions
a) Classroom (large group). The lecturer explains topic contents to students, give practical demonstrations, set exercises and assignments and clarify doubts.
b) Laboratory (small group). The students carry out practical exercises on the laboratory with computers.
c) Assessment. Individual tests.

Unsupervised sessions
d) Individual or group study.
e) Preparation on exercises and assignments.
LEARNING OBJECTIVES OF THE SUBJECT

On completion of the course, students should be able to:
Understand audio signal digitalisation, processing and coding.
Open, visualise, reproduce, edit and store audio files in a programming environment.
Use basic digital techniques to process audio signals.
Analyse and interpret the characteristics of audio signals in terms of time and frequency.
Identify the main voice and audio coding methods.
Program basic functions and applications for processing real signals.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>10.00</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>45,0</td>
<td>30.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

1. DIGITAL AUDIO

Description:
Introduction to digital audio. Visualization of signals. File formats.

Related activities:
L1: Lecture of audio files

Full-or-part-time: 14h
Theory classes: 6h
Laboratory classes: 2h
Self study: 6h

2. DIGITALIZATION

Description:

Related activities:
L2: Format conversion

Full-or-part-time: 22h
Theory classes: 6h
Laboratory classes: 4h
Self study: 12h
### 3. TIME-DOMAIN PROCESSING

**Description:**

**Related activities:**
L3: Analysis of characteristics of audio signals

**Full-or-part-time:** 28h  
Theory classes: 8h  
Laboratory classes: 4h  
Self study: 16h

### 4. FREQUENCY-DOMAIN ANALYSIS

**Description:**

**Related activities:**
L4: Tone frequency analysis

**Full-or-part-time:** 28h  
Theory classes: 8h  
Laboratory classes: 4h  
Self study: 16h

### 5. SPECTRAL ESTIMATION

**Description:**
Periodograms. Linear prediction.

**Full-or-part-time:** 30h  
Theory classes: 6h  
Laboratory classes: 4h  
Self study: 20h

### 6. APPLICATIONS

**Description:**
Digital audio effects. Coding. Audio information retrieval.

**Related activities:**
L6: Music identification

**Full-or-part-time:** 28h  
Theory classes: 6h  
Laboratory classes: 2h  
Self study: 20h
GRADING SYSTEM

Exam 1 (35%), Exam 2 (35%), Laboratory (30%)

The second exam is scheduled on the last week of lectures. During the final exams period, all students have a chance to improve their qualifications of previous exams. The final mark is the best of the two for each part.

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.

If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

BIBLIOGRAPHY

Complementary: