# Pla Docent de l'Assignatura

## Teaching Guide

**Course name:** Sound Creation Lab
**Academic year:** 2011-2012 **Course:** Third **Trimester:** Third

**Degrees:** Grau en Enginyeria en Informàtica (Optativa) i Grau en Enginyeria en Sistemes Audiovisuals (Optativa)

**Course Code:** 21493-21629
**Number of credits ECTS:** 4
**Total number of hours:** 100 hores
**Language:** anglès
**Teachers:** Emilia Gómez, Justin Salamon
**Coordinator:** Emilia Gómez

## 1. Course description

**Course name:**Laboratori de Creació Sonora
**Academic course:**2011-2012
**Course:**Tercer
**Trimester:** Tercer
**Estudis:** Grau en Enginyeria en Informàtica (Optativa) i Grau en Enginyeria en Sistemes Audiovisuals (Optativa)
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## 2. Course presentation

This course deals with sound recording, description, transformation and generation. We will work with sounds produced by humans, animals, sounds from the environment and sounds of music. We will learn how to record them, analyze and describe them, process them and use them in a creative way.

Prerequisites

To take this course it is desirable to have an engineering background, to have taken some courses in Mathematics at the undergraduate level, such asLinear Algebra or Calculus, and also to be familiar with basic signal processing concepts (related courses: Signals and Systems, Speech Processing, Audio and Music Processing). Programming experience is also desirable.

## 3. Competences

These are the competences we will work in the course according to the official description of the studies:

| Competències transversals | Competències específiques |
|---|---|
| *Instrumentals*<br><br>G1. Capacitat d'anàlisi i síntesi<br>G2. Capacitat d'organització i planificació<br>G3. Capacitat per aplicar els coneixements a l'anàlisi de situacions i la resolució de problemes<br>G4. Habilitat en la cerca i la gestió de la informació<br><br>G5. Habilitat en la presa de decisions<br><br>*Interpersonals*<br><br>G8. Capacitat de treball en equip | *Competències de tecnologia específica: Sistemes Audiovisuals*<br>AU6. Coneixements de les tècniques de tractament de senyals d'àudio i música. Desenvolupament d'aplicacions informàtiques basades en el processament de música.<br>AU7. Adquirir el coneixement teòric i pràctic dels equips de mesura i reproducció del camp acústic<br><br>AU12. Adquirir coneixements sobre la cadena de producció, post-producció i exhibició en projectes audiovisuals.<br><br>AU34. Conèixer les tècniques i procediments d'enregistrament, generació i producció de continguts d'àudio i música. Aplicació pràctica dels coneixements d'acústica, de processament de senyal |

| | |
|---|---|
| *Sistèmiques*<br><br>G11. Capacitat d'aplicar amb flexibilitat i creativitat els coneixements adquirits i d'adaptar-los a contextos i situacions noves<br><br>G12. Capacitat per progressar en els processos de formació i aprenentatge de manera autònoma i contínua<br><br>Elija un elemento. | i de sistemes multimèdia en la de senyal i de sistemes multimèdia en la creació de continguts sonors per a produccions audiovisuals.<br><br>AU15. Adquirir los conocimientos básicos sobre el análisis de datos, estudiando sus regularidades, técnicas de predicción y algoritmos de clasificación.<br><br>AU23 Saber decidir que sistema de codificación de audio y música debe utilizarse para una determinada aplicación. |

## 4. Contents

1. Introduction:
    - Course introduction
    - The Soundscapes – Our Sonic Environment.
2. Recording
    - Practical sound recording with handy devides.
3. Sound Description:
    - Taxonomies
    - Manual labeling
    - Automatic description
4. Sound Classification.
    - Techniques for similarity computation
    - Classification techniques: supervised vs unsupervised classification
5. Sound Transformation and Synthesis
    - Synthesis techniques
    - Basic sound effects
    - Sound transformations in the spectral domain
    - Soundscape generation
6. Artistic and research projects related with soundscape generation
    - The Freesound project
    - Sons de Barcelona
    - Metaverse

## 5. Methodology

This is a practical course that will combine the following activities: lectures, paper presentations, practical sessions (labs) and seminars.

In the lectures, we will review the main theoretical concepts related to sound description, labeling, classification, transformation and synthesis and we will present a set of research and artistic projects related to sound design and sound processing. We will also propose a set of specific readings that the students will present and comment in class.

In the hands-on sessions (labs), the students will perform guided work with computers.The labs should be carried out individually. Students will present their results by a set of written reports.

In the seminars, the students will carry out an artistic project, a sonic composition, in small groups. The seminars will consist on tutoring sessions, project status presentation and a final project presentation and concert.

Homework: each week, all students are expected to review the lecture material, to work on a set of exercices and small programming assignments proposed at the hands-on sessions, and to develop their final project.

Final exam: the student will be asked to discuss some of the topics of the course at a final exam.

| Topics | Teaching hours | | | Hours for personal work | |
|---|---|---|---|---|---|
| | Lecture group | Lab group | Seminar group | | |
| 1.Introduction | 4 | 0 | 1 | 7 | |
| 2. Recording | | 2 | 2 | 12 | |
| 3. Description | 4 | 2 | 1 | 8 | |
| 4. Classification | 4 | 2 | 1 | 8 | |
| 5.Transformation and Generation | 2 | 2 | 3 | 8 | |
| 6.Projects | 2 | | | 4 | |
| Project/exam preparation | 2 | 2 | | 17 | |
| Total | 18 | 10 | 8 | 64 | 100 hours (ECTS*25) |

## 6. Course evaluation

- Final exam (30%)
- Reading assignment (10%)
- Lab reports (30%)

- Project: seminar activities, final presentation and concert (30%)

## 7. Bibliography

Main references


- Gouyon, F. Herrera, P. Gómez, E. Cano, P. Bonada, J. Loscos, À. Amatriain, X. Serra, X."Content processing of music audio signals" In "Sound to sense, sense to sound:A state- of-the-art in Sound and Music Computing," Polotti P. and Roccheso D. (eds). Logos Verlag, Berlin GmbH, 2008 ISBN 978-3-8325-1600-0
- Ecological Acoustics Perspective for Content-Based Retrieval of Environmental Sounds. Gerard Roma, Jordi Janer, Stefan Kersten, Mattia Schirosa, Perfecto Herrera, Xavier Serra EURASIP Journal on Audio, Speech, and Music Processing 2010, 2010:960863 (5 December 2010)
- Nicola Orio: Music Retrieval: A Tutorial and Review
- Schafer, R. M.Our Sonic Environment and The Soundscape – The Tuning of the World, Destiny books, 1977.
- Farnell, Andy. Designing Sound, The MIT Press.


Complementary bibliography


- Chion Michel: La audiovisión: Introducción a un análisis conjunto de la imagen y el sonido; Paidos Comunicación.
- Rodriguez Angel: La dimensión sonora del lenguaje audiovisual; Paidos papeles de comunicación.
- Sonnensschein David: Sound Design: The expressive Power of Music, Voice and Sound Effects in Cinema; Michael Wiese Productions.


The moodle of the course will contain:

- Lecture material (slides and references)
- Reading assignments
- Lab instructions
- Seminar instructions
- Project material

## 8. Activities

a. Sessions

Lecture (all), Lab sessions, (all)Seminars (2 groups)

| | Wednesday 12.30-14.30 | Thursday 10.30-12.30 | Friday 08.30-10.30 |
|---|---|---|---|
| 1: 9 - 13 Apr | L1: Introduction, General Concepts. | Sem1: Project Definition (1 h: 10:30 G1, 11:30 G2) | |
| 2: 16 - 20 Apr | L2: Sound Content Description | | |
| 3: 23 – 27 Apr | Lab1: Recording | Sem2: Gathering Sound Material (2 h: G1) | Sem2: Gathering Sound Material (2 h: G2) |
| 4: 30 abr-4 May | L3: Sound and Music Content Description | Lab2: Labeling and Description | |
| 5: 7 - 11 May | L4: Sound Similarity, Classification and | Lab3: Classification and Clustering | |

| | | | |
|---|---|---|---|
| | Clustering | | |
| 6: 14 - 18 May | L5: Sound Transformation and Synthesis | Sem3: Sound Description (2 h: G2) | Sem3: Sound Description (2 h: G 1) |
| 7: 21 - 25 May | L6: Paperpresentations | Lab4: Transformation and Generation | |
| 8: 28 May- 1 June | L7: Artistic Projects Dealing with Sound Composition | Sem4: Sound Transformations (1h:10:30 G1, 11:30 G2) | |
| 9: 4 - 8 June | L8: Research Projects Dealing with Sound Composition | Sem5: Generation (2h: G1) | Sem5: Generation (2h: G2) |
| 0: 11 -15 June | L9: Concert | Lab5: Project Presentation | |
| 11: 18 -22 June | **EXAMS** | **EXAMS** | **EXAMS** |

### b. List of activities

| Activitat | Data enunciat | Data lliurament | Data de lliurament de resultats |
|---|---|---|---|
| Lab1 | 22 April | 2 May | 9 May |
| Lab2 | 30April | 9 May | 16 May |
| Lab3 | 7 May | 23 May | 30 May |
| Lab4 | 21 May | 14 June | 21 June |
| Presentation | 9 June | 14 June | 21 June |
| Seminar | Each seminar | Each seminar | Each seminar |