

60936 - Speech technologies

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	533 - Master's Degree in Telecommunications Engineering
ECTS	5.0
Course	2
Period	First semester
Subject Type	Optional
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

P1: Participative Lecture

P2: Classroom Practical Sessions

P3: Supervised individual or team practical work

P4: Laboratory Sessions

5.2.Learning activities

Participative Lecture:

Presentation by the lecturer of the main contents of the course. This activity will take place in the classroom. Theoretical knowledge is provided to the students in such a way that it will allow them to achieve all the specified learning outcomes and all the specified competencies.

Classroom Practical Sessions:

Statement and/or resolution of exercises and problems in the classroom. Their topics will be closely related to the contents of the course. This activity is designed to advance gradually in all specified learning outcomes and competencies transversally.

Supervised individual or team practical work:

Deliverables will be requested related to the resolution of practical problems in teams for several parts of the syllabus. Results must be submitted in time and in the correct format. This activity is designed to consolidate all specified learning outcomes and competencies as well as their development. The results of these works is one of the evaluation activities.

Laboratory Sessions:

Involves eight hours in the computer classroom, in several (up to 5) 2-hour practical sessions. The efficient achievement of the sessions time, some previous preparation of the work are required and some after-lab work with the obtained results to settle the concepts. Through these activities all specified learning outcomes and competencies are strengthened and reinforced. In the documentation delivered, each student will be able to find a detailed description of the activities to be performed in the lab as well as the way in which the student must demonstrate the acquisition of the relevant results and competences, since this work belongs also to one of evaluation activities.

5.3.Program

1. Introduction to speech technologies

- Speech Communication model
- Speech Generation
- Speech Perception

2. Fundamentals of pattern recognition

- Bayes Decision Theory
- Classifiers
- Extraction and selection of features
- Unsupervised estimation methods

3.Speech Processing

- Speech production digital model
- Short-term analysis, time-frequency representation
- Linear Prediction
- Homomorphic Analysis
- Applications: pitch and formants estimation, noise reduction

4. Automatic Speech Recognition

- Historical perspective and state of the art
- Acoustic Modelling

60936 - Speech technologies

- Language Modelling
- Basic search algorithms
- Applications and toolkits

5. Text to speech conversion

- Historical perspective and state of the art
- Linguistic Analysis
- Speech Synthesis
- Applications and toolkits

6. biometric Speaker recognition

- Historical perspective and state of the art
- Verification and speaker identification
- Applications and toolkits

5.4.Planning and scheduling

The schedule of the course, both the classroom sessions and the laboratory sessions, will be determined by the academic calendar that the school will establish for the academic year

5.5.Bibliography and recommended resources

- Rabiner, Lawrence Richard. Digital processing of speech signals / Lawrence R. Rabiner, Ronald W. Schafer Upper Saddle River (New Jersey) : Prentice-Hall, cop. 1978
- Huang, Xuedong. Spoken language processing : a guide to theory, algorithm, and system development / Xuedong Huang, Alex Acero, Hsiao -Wuen Hon Upper Saddle River, New Jersey : Prentice Hall PTR, cop. 2001
- O'Shaughnessy, Douglas. Speech communications : human and machine / Douglas O'Shaughnessy . - 2nd ed. New York : IEEE Press, cop. 2000
- The HTK Book (for version 3.4) / S. Young...[et al.] . Cambridge University Engineering Department, 2009.
- Sphinx-4: A flexible open source framework for speech recognition / W. Walker...[et al.] Sun Microsystems Inc., Technical Report SML1 TR2004-0811, 2004
- Beigi, Homayoon. Fundamentals of Speaker Recognition / Beigi, Homayoon New York: Springer, 2011
- Taylor, Paul. Text-to-Speech Synthesis / Paul Taylor Academic press, 2009
- Jurafsky, Daniel. Speech and Language Processing: An Introduction to Natural Language Processing, Speech Recognition, and Computational Linguistics / Jurafsky, Daniel, and James H. Martin. - 2nd ed. Prentice-Hall, 2009