Academic Year/course: 2024/25

61081 - Speech and language technologies

Syllabus Information

Academic year: 2024/25
Subject: 61081 - Speech and language technologies
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 658 - Master in Telecommunications Engineering
ECTS: 3.0
Year: 2
Semester: First semester
Subject type: Optional
Module:

1. General information

The course "Speech and Language Technologies" aims to acquire knowledge and understanding of the different technologies that make up automatic human-machine interaction systems based on both oral and written language. It introduces students to the fundamental algorithms of natural language processing and their applications in information retrieval and dialogue systems.

2. Learning results

HA_04: Ability for mathematical modeling, calculation, and simulation in technology centers and corporate engineering, particularly in research, development, and innovation tasks in all areas related to Telecommunication Engineering and related multidisciplinary fields.

HA_10: Ability to apply methods from information theory, adaptive modulation, and channel coding, as well as advanced digital signal processing techniques to communication and audiovisual systems.

HA_24: Ability to integrate technologies and systems specific to Telecommunication Engineering, with a generalist approach, in broader and multidisciplinary contexts such as bioengineering, photovoltaic conversion, nanotechnology, telemedicine.

CP_06: Continuous self-learning.

CP_07: Ability to communicate (both orally and in writing) conclusions—and the knowledge and reasons behind them—to specialized and non-specialized audiences clearly and unambiguously.

3. Syllabus

Block 1: Fundamentals

- **Topic 1:** Introduction to speech technologies: speech generation and perception, voice recognition and synthesis.
- **Topic 2:** Introduction to natural language processing: text processing, semantic spaces, and vectors.

Block 2: Technologies

- **Topic 3:** Language models: from N-grams to large language models.
- **Topic 4:** Dialogue systems.
- **Topic 5:** Question Answering and Information retrieval systems.

4. Academic activities

- **Interactive Lecture:** Sessions with the professor where the course content will be explained: 20 hours.
- **Laboratory Practices:** Practical cases to be solved in the laboratory: 10 hours.
- **Student Assignments:** Includes both evaluable assignments and the preparation of laboratory practice reports: 20 hours.
- **Personal Study and Work:** 23 hours.
- **Evaluation Tests:** 2 hours.

5. Assessment system

The course will be evaluated through a global evaluation modality via the following activities:

- **Midterm Exams:** (30% of the grade, minimum 4 out of 10), activities proposed in the lectures will be evaluated.
- **Learning Portfolio:** (70% of the grade), laboratory practices will be evaluated (40%) and the presentation of a student assignment (30%).

If the student has not passed any of these activities during the semester, they will have the opportunity to pass the course through a global test in the two official calls.

6. Sustainable Development Goals

8 - Decent Work and Economic Growth
9 - Industry, Innovation and Infrastructure