

## Speech Processing (E010220)

**Course size** *(nominal values; actual values may depend on programme)*

**Credits 4.0**

**Study time 120 h**

**Course offerings and teaching methods in academic year 2025-2026**

A (semester 2)

English

Gent

lecture

independent work

**Lecturers in academic year 2025-2026**

Demuyne, Kris

TW06

lecturer-in-charge

**Offered in the following programmes in 2025-2026**

**crdts**

**offering**

Master of Science in Electrical Engineering (main subject Communication and Information Technology )

4

A

Master of Science in Computer Science

4

A

Master of Science in Computer Science Engineering

4

A

Exchange Programme in Computer Science (master's level)

4

A

**Teaching languages**

English

**Keywords**

Speech coding, speech recognition, speech synthesis

**Position of the course**

In this course, the basic principles underlying modern systems for speech recognition, speech coding (e.g. GSM, MPEG), and speech synthesis are explained. Modern speech processing builds upon the principles of signal processing, machine learning (including deep learning), and artificial intelligence (search algorithms). In that aspect, this course also serves as an introduction to (or recapitulation of) these techniques as well as an illustration of the application of these techniques in a specific domain.

**Contents**

- Speech and hearing
- Speech recognition
- Digital speech reproduction
- Speech synthesis

**Initial competences**

no foreknowledge required

**Final competences**

- 1 Get to know the properties of speech as an acoustic signal or as a carrier of linguistic information.
- 2 Get to know the most important speech coding methods and understand the underlying basic principles.
- 3 Get to know the major components of a speech recognition system and the way they these components operate and interact with each other.
- 4 Get to know the major components of s speech synthesis system and the way these components operate and interact
- 5 Be able to apply knowledge of speech production and perception to understand why certain decisions were made during the design of speech processing systems.
- 6 Learn how to combine principles from signal processing, computational

linguistics, machine learning, and artificial intelligence in one system.

7 Learn when and how to speech processing technology can help to build new applications or to improve the human-machine interaction in existing application.

8 Learn to understand the principles beyond the theory in such a way that you can also apply them in other domains such as image processing or dynamic system modeling.

#### **Conditions for credit contract**

Access to this course unit via a credit contract is determined after successful competences assessment

#### **Conditions for exam contract**

This course unit cannot be taken via an exam contract

#### **Teaching methods**

Lecture, Independent work

#### **Study material**

None

#### **References**

- Spoken Language Processing; X. Huang, A. Acero, H. Hon; 2001; Prentice Hall (ISBN 0-13-022616-5)

#### **Course content-related study coaching**

#### **Assessment moments**

end-of-term and continuous assessment

#### **Examination methods in case of periodic assessment during the first examination period**

Oral assessment open-book

#### **Examination methods in case of periodic assessment during the second examination period**

Oral assessment open-book

#### **Examination methods in case of permanent assessment**

Assignment

#### **Possibilities of retake in case of permanent assessment**

examination during the second examination period is possible in modified form

#### **Extra information on the examination methods**

During examination period: oral open-book exam

During semester: graded project reports. Second chance: Possible in adapted form

#### **Calculation of the examination mark**

The graded project report (during semester) counts for 1/4 of the points. The written exam counts for the other 3/4 of the points.