

## Signal Processing (E010010)

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

**Credits 6.0**

**Study time 180 h**

**Course offerings and teaching methods in academic year 2023-2024**

A (semester 2)

English

Gent

lecture

practical

seminar

**Lecturers in academic year 2023-2024**

Madhu, Nilesh

TW06

lecturer-in-charge

**Offered in the following programmes in 2023-2024**

[Bachelor of Science in Engineering\(main subject Electrical Engineering\)](#)

**crdts**

**offering**

6

A

[Master of Science in Computer Science Engineering](#)

6

A

**Teaching languages**

English

**Keywords**

signal processing, digital filters, DFT, spectral analysis, non-stationary signals and systems

**Position of the course**

Learn how to apply signal models for the solution of diverse problems in signal processing.

Learn to design signal processing systems from specifications.

**Contents**

- Signal models: Signal spaces, signal transformations, applications
- Digital-filter design: IIR and FIR filters; multirate filtering
- The DFT and its applications: FFT, fast convolution, filtering in frequency domain, cepstrum
- Spectral signal analysis
- Non-stationary signals and systems

**Initial competences**

This course builds further upon the concepts introduced in the course "Systems and Signal Analysis"

**Final competences**

- 1 Understand and correctly interpret signal processing methods and models
- 2 Understand and apply digital filter design methods
- 3 Convert a realistic problem statement into signal processing system specifications
- 4 Selection of the best design method for accomplishing certain system requirements
- 5 Inventarisation and comparison of suitable methods for solving a specific problem

**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**

Seminar, Lecture, Practical

**Learning materials and price**

Course notes and slides will be made available on the digital learning platform.

**References**

- Alan V. Oppenheim & Ronald W. Schaffer. Discrete-Time Signal Processing, (2nd or 3rd edition), Pearson Education Limited, 2009, ISBN-13: 9780131988422
- J. Proakis & D. Manolakis. Digital Signal Processing : Principles, algorithms & applications (2nd edition). Macmillan, 1992

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

The instructor is available for discussion and clarifications before and after the class. He may also be contacted by email.

#### **Assessment moments**

end-of-term and continuous assessment

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

Written assessment with open-ended questions

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

Written assessment with open-ended questions

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

Assignment

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

examination during the second examination period is not possible

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

During examination period: Closed-book exam. However: students are allowed to bring with them four (4) A4-sheets of paper (double-sided) with **handwritten** notes. No photocopies, printouts etc. allowed.

During semester: graded project reports. Second chance: Not possible

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

The final score is based on a weighted average of the score obtained for the computer projects and the score obtained in the final exam. However, students must pass both parts to pass the course.

Calculation of score:

- Weight of computer projects =  $1/2$
- Weight of final exam =  $1/2$

If the score on any one component (projects or written exam) is less than 50%, then the final score will be reduced to  $9/20$ .

If the score on the written exam is less than 40% then the final score will be reduced to the lowest score of  $7/20$ , such that it cannot be considered for deliberation.