

## Advanced Modulation and Coding (E012210)

**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

seminar

### Lecturers in academic year 2025-2026

Steendam, Heidi

TW07

lecturer-in-charge

Noels, Nele

TW07

co-lecturer

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

[Master of Science in Electrical Engineering \(main subject Communication and Information Technology \)](#)

**crdts**

4

**offering**

A

[Master of Science in Electrical Engineering \(main subject Electronic Circuits and Systems\)](#)

4

A

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

4

A

### Teaching languages

English

### Keywords

modulation, coding, detection, estimation

### Position of the course

This course deals with communication systems that make use of advanced modulation, coding, detection and estimation. A selection of the topics mentioned below will be covered

### Contents

- Advanced coding: turbo codes; LDPC codes
- Advanced modulation and detection: Modulation and detection for systems with multiple antennas (MIMO)
- Iterative ("turbo") estimation and detection: decoding; equalization; synchronization

### Initial competences

Communication Theory

### Final competences

- 1 Recognize and use factor graphs.
- 2 Analyse and apply turbo codes, LDPC codes.
- 3 Evaluate systems with multiple antennas.
- 4 Apply turbo estimation.
- 5 Understand and use techniques to reduce the effect of interference.
- 6 Understand and use iterative techniques to reach theoretical performance bounds.

### 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

**Study material**

Type: Slides

Name: Advanced modulation and coding

Indicative price: Free or paid by faculty

Optional: no

Language : English

Number of Slides : 200

Oldest Usable Edition : version of 2015

Available on Ufora : Yes

Online Available : Yes

Available in the Library : No

Available through Student Association : No

**References**

H. Wymeersch, Iterative Receiver Design, Cambridge University Press, ISBN: 978-0521873154

**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

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

Oral assessment

**Examination methods in case of permanent assessment**

Oral 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: oral closed-book exam

During semester: graded report independent work; graded oral presentation.

Second chance: Not possible

**Calculation of the examination mark**

Evaluation throughout semester as well as during examination period. Special conditions: Evaluation throughout semester : 75% Examination : 25%