

## 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
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**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**

	<b>crdts</b>	<b>offering</b>
<a href="#">Master of Science in Electrical Engineering (main subject Communication and Information Technology )</a>	4	A
<a href="#">Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)</a>	4	A
<a href="#">Master of Science in Computer Science Engineering</a>	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%