

## Information Theory (E003600)

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

**Credits** 6.0      **Study time** 180 h      **Contact hrs** 60.0 h

**Course offerings and teaching methods in academic year 2017-2018**

A (semester 2)	seminar: coached exercises	27.5 h
	project	2.5 h
	guided self-study	30.0 h
B (semester 2)	seminar: coached exercises	27.5 h
	project	2.5 h
	lecture	30.0 h

**Lecturers in academic year 2017-2018**

Steendam, Heidi      TW07      lecturer-in-charge

**Offered in the following programmes in 2017-2018**

	crdts	offering
Bridging Programme Master of Science in Electrical Engineering (main subject Communication and Information Technology )	6	B
Bridging Programme Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems )	6	B
Brugprogramma Master of Science in Bioinformatics (main subject Engineering)	6	B
Bridging Programme Master of Science in Computer Science Engineering	6	A
Bridging Programme Master of Science in Computer Science Engineering	6	B
Master of Science in Electrical Engineering (main subject Communication and Information Technology )	6	B
Master of Science in Electromechanical Engineering (main subject Control Engineering and Automation)	6	B
Master of Science in Electromechanical Engineering (main subject Electrical Power Engineering)	6	B
Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)	6	B
Master of Science in Bioinformatics (main subject Engineering)	6	B
Master of Science in Electromechanical Engineering (main subject Maritime Engineering)	6	B
Master of Science in Electromechanical Engineering (main subject Mechanical Construction)	6	B
Master of Science in Electromechanical Engineering (main subject Mechanical Energy Engineering)	6	B
Master of Science in Computer Science	6	B
Master of Science in Mathematical Informatics	6	A
Master of Science in Computer Science Engineering	6	A
Master of Science in Computer Science Engineering	6	B
Master of Science in Electrical Engineering	6	A
Master of Science in Photonics Engineering	6	B
Exchange Programme in Bioinformatics (master's level)	6	B
Exchange Programme in Computer Science (master's level)	6	B

**Teaching languages**

Dutch, English

### **Keywords**

source coding, channel coding

### **Position of the course**

This course provides an in-depth treatment of the concepts and principles of source coding (compression and quantization) and channel coding (protection against transmission errors). Derivation of the theoretical bounds and study a number of important classes of practical codes.

### **Contents**

- Introduction
- Information measure
- Source coding: Source models, Coding of discrete sources, Coding of analog sources, Source coding theorem, rate distortion theory
- Channel coding: Channel models, Channel capacity, channel coding theorem
- Error detecting and error correcting codes: Linear block codes, Cyclic codes, Convolutional codes

### **Initial competences**

Communication theory: partim data communication

### **Final competences**

- 1 Compute theoretical bounds for source and channel coding.
- 2 Use lossless and lossy source coding.
- 3 Compute the optimal quantizer.
- 4 Analyse hard and soft decoding.
- 5 Recognize the graphical representation of codes.
- 6 Apply Viterbi decoding.
- 7 Apply error detection and error correction for soft and hard decoding.
- 8 Compute performance.

### **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**

Guided self-study, lecture, project, seminar: coached exercises

### **Learning materials and price**

Dutch course notes

### **References**

- J.G. Proakis: Digital Communications (McGraw-Hill), ISBN: 978-0072321111
- S. Benedetto, E. Biglieri : Principles of Digital Transmission (Kluwer Academic / Plenum Publishers), ISBN: 0306457539

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

### **Evaluation methods**

end-of-term evaluation and continuous assessment

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

Written examination, open book examination

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

Written examination, open book examination

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

Report

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

examination during the second examination period is possible in modified form

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

During examination period: written open book exam  
During semester: graded project reports. Second chance: if score less than 8/20: oral examination

**Calculation of the examination mark**

Evaluation throughout semester as well as during examination period. Special conditions: evaluation throughout semester: 20% examination: 80% The score of the evaluation throughout the semester obtained in the first examination period counts in the second examination period for 20% of the total. If the score of the evaluation throughout the semester is less than 8/20, the student cannot pass for the course. The end score is then the lowest of the two scores.