

## 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 2018-2019

Offering	Language	Teaching Methods	Hours
A (semester 2)	Dutch	seminar: coached	27.5 h
		exercises	
		project	2.5 h
		guided self-study	30.0 h
B (semester 2)	English	seminar: coached	27.5 h
		exercises	
		lecture	30.0 h
		project	2.5 h

### Lecturers in academic year 2018-2019

Steendam, Heidi TW07 lecturer-in-charge

### Offered in the following programmes in 2018-2019

Programme	crdts	offering
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 Computer Science Engineering	6	A
Master of Science in Computer Science Engineering	6	B
Master of Science in Electrical Engineering	6	A
European Master of Science in Photonics	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

English 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.