GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2018-2019

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 2019-2020

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

Lecturers in academic year 2019-2020

Steendam, Heidi	TW07	lecturer-in-charge

Offered in the following programmes in 2019-2020	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 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
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

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.