GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2015-2016

Estimation and Decision Techniques (E003421)

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

Credits 4.0	Study time 120 h	Contact hrs	30.0 h

Course offerings and teaching methods in academic year 2018-2019

A (semester 1)	English	seminar: coached exercises	15.0 h
		lecture	15.0 h
B (semester 1)	Dutch	seminar: coached exercises	15.0 h
		guided self-study	15.0 h

Lecturers in academic year 2018-2019

De Clercq, Sofian	TW07	lecturer-in-charge
Luong, Hiep	TW07	co-lecturer

Offered in the following programmes in 2018-2019	crdts	offering
Brugprogramma Master of Science in Bioinformatics (main subject Engineering)	4	A
Bridging Programme Master of Science in Industrial Engineering and Operations Research	4	A
Bridging Programme Master of Science in Industrial Engineering and Operations Research	4	A
Master of Science in Electrical Engineering (main subject Communication and Information Technology)	4	A
Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)	4	A
Master of Science in Bioinformatics (main subject Engineering)	4	A
Master of Science in Industrial Engineering and Operations Research	4	B
Master of Science in Computer Science Engineering	4	A
Master of Science in Computer Science Engineering	4	A
European Master of Science in Photonics	4	A
Master of Science in Industrial Engineering and Operations Research	4	A
Exchange Programme in Bioinformatics (master's level)	4	A

Teaching languages

Dutch, English

Keywords

Estimation, Decision, Detection, Mean Square Error, Maximum Likelihood, Bayesian Inference

Position of the course

This introductory course aims at providing insight into a number of alternative methods that can be applied to estimate unknown quantities (estimation) or in testing hypotheses (decision).
These methods are applied in a.o. communications engineering, signal processing, and data processing.

Contents

- Introduction: problem formulation
- Classical estimation theory: Fisher estimation, minimum-variance unbiased

estimates, maximum-likelihood estimates, Pearson's method of moments, linear estimates, least-squares estimates
- Bayesian estimation theory: Bayesian estimates, linear Bayesian estimates
- Decision theory: classical decision, Bayesian decision
- Conclusions: overview

Initial competences

Know how to apply the basic rules of probability theory, possess knowledge about frequently used probability distributions

Final competences

1 Cast estimation or detection problems into a mathematical model.
2 Determine optimal receiver structures.
3 Determine (or approximate) the performance of receiver structures.
4 Develop an intuitive feeling for the resulting solution.
5 Weigh the pro's and con's of the different paradigms.

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, seminar: coached exercises

Learning materials and price

Syllabus (in English, available for download on Minerva or for sale at the price of the copies)

References

- S. Kay, "Fundamentals of Statistical Signal Processing, Volume 1: Estimation Theory" (Prentice Hall, 1993).
- S. Kay, "Fundamentals of Statistical Signal Processing, Volume 2: Detection Theory" (Prentice Hall, 1998).

Course content-related study coaching

Interactive support through Minerva and/or personal (by appointment)

Evaluation methods

end-of-term evaluation

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

Possibilities of retake in case of permanent evaluation

not applicable

Extra information on the examination methods

During examination period: written open-book exam - problems

Calculation of the examination mark