Estimation and Decision Techniques (E003421)

Valid as from the academic year 2015-2016

Course Specifications

Lecturers in academic year 2015-2016
De Clercq, Sofian
Luong, Hiep

Course offerings and teaching methods in academic year 2015-2016

A (semester 1)
- seminar: coached exercises 15.0 h
- lecture 15.0 h

B (semester 1)
- seminar: coached exercises 15.0 h
- guided self-study 15.0 h

Offered in the following programmes in 2015-2016

<table>
<thead>
<tr>
<th>Programme</th>
<th>Credits (nominal values; actual values may depend on programme)</th>
<th>Offering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brugprogramma Master of Science in Bioinformatics (main subject Engineering)</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Bridging Programme Master of Science in Industrial Engineering and Operations Research</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Bridging Programme Master of Science in Industrial Engineering and Operations Research</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Master of Science in Electrical Engineering (main subject Communication and Information Technology)</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Master of Science in Electrical Engineering (main subject Electronic Circuits and Systems)</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Master of Science in Bioinformatics (main subject Engineering)</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Master of Science in Computer Science Engineering (main subject Information and Communication Technology)</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Master of Science in Industrial Engineering and Operations Research</td>
<td>4</td>
<td>B</td>
</tr>
<tr>
<td>Master of Science in Computer Science Engineering</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Master of Science in Computer Science Engineering</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Master of Science in Industrial Engineering and Operations Research</td>
<td>4</td>
<td>A</td>
</tr>
</tbody>
</table>

Contact hrs 30.0 h
Study time 120 h
Credits 4.0
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
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 pros and cons 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

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

(Approved)