Course Specifications
Valid as from the academic year 2018-2019

Course offerings and teaching methods in academic year 2018-2019

A (semester 1)  Dutch  
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<th>Lecture</th>
<th>Practicum</th>
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<tr>
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Offered in the following programmes in 2018-2019

Bachelor of Science in Engineering Technology (main subject Electromechanical Engineering Technology) 6 A
Bachelor of Science in Engineering Technology (main subject Electronics and ICT Engineering Technology) 6 A
Bachelor of Science in Electronics and ICT Engineering Technology 6 A
Bachelor of Science in Electromechanical Engineering Technology 6 A
Linking Course Master of Science in Electrical Engineering Technology (main subject Automation) 6 A
Linking Course Master of Science in Electrical Engineering Technology (main subject Electrical Engineering) 6 A
Linking Course Master of Science in Electronics and ICT Engineering Technology (main subject Electronics Engineering) 6 A
Linking Course Master of Science in Electromechanical Engineering Technology 6 A

Teaching languages
Dutch

Keywords
PID, closed loop control, root locus, bode plot, sampling

Position of the course
The controller design based on known process dynamics is studied so that transient and steady-state design requirements are fulfilled. The design of both analog and digital SISO controllers is considered. Concerning these dynamical systems and controllers, the focus is on insights. Different design techniques are discussed, the control engineer has to decide which technique is best suited.

Contents
1. Control system properties
2. Dynamic system models
3. PID control loop
4. Dynamic systems characteristics and performance
5. Root locus techniques
6. Frequency domain techniques
7. Implementation issues

(Approved)
Initial competences

- Being able to use complex, integral and differential calculus.
- Knowing the dynamics of basic electrical and mechanical components.

Therefore, the following courses should be followed:

- Mathematics III and research methodology
- Basic Electronics
- Mechanics

Final competences

1. Having insight on closed loop principles.
2. Having insight on Proportional, Integral and Differential control components.
3. Being able to describe the process dynamics of an electrical and mechanical system in a formula.
4. Having insight on the relation between system properties on one hand and response time, transient and steady-state behavior on the other hand.
5. Being able to analyze a system and design a controller based on root locus design techniques. Being able to report on this in a convincing way.
6. Being able to analyze a system and design a controller based on frequency response techniques. Being able to report on this in a convincing way.
7. Being able to implement a controller considering non-linearity’s, digital issues and windup.

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

- Lecture, practicum, seminar: coached exercises, seminar: practical PC room classes

Extra information on the teaching methods

- Practicum:
  Measuring the process dynamics of an unknown system. Design a controller based on the known techniques. The results should be summarized in a limited written report.

Learning materials and price

- S. Derammelaere and K. Stockman, “Regeltechniek”, Course notes available through course service, 150 pages.

References


Course content-related study coaching

- The lecturers could be contacted via e-mail.

Evaluation methods

- End-of-term evaluation and continuous assessment

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

- Oral examination

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

- Oral 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

- Oral exam: Oral examination based on a written preparation, closed book exam. Questions concerning insights, exercises and matlab exercises will be asked.
- Report: A written report concerning the practicum. This report can only be filed once, in the first examination period.

Calculation of the examination mark

- The total score is the weighted sum of the results of the exam Control Engineering (80%) and the report (20%).
- Even for a score equal or higher than 10/20, to pass the course at least 7/20 for each partim has to be reached. When this condition is not met, there will be a modification of
the calculated number to 9/20.