Course Specifications
Valid as from the academic year 2018-2019

Electromechanic Drive Lines (E630094)

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

<table>
<thead>
<tr>
<th>Credits</th>
<th>Study time</th>
<th>Contact hrs</th>
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<tr>
<td>3.0</td>
<td>90 h</td>
<td>36.0 h</td>
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Course offerings and teaching methods in academic year 2018-2019

A (semester 2) Dutch lecture 18.0 h
practicum 18.0 h

Lecturers in academic year 2018-2019

Stockman, Kurt TW08 lecturer-in-charge
Dereyne, Steve TW08 co-lecturer
Vanwalleghem, Bart TW08 co-lecturer

Offered in the following programmes in 2018-2019

| Bachelor of Science in Engineering Technology (main subject Electromechanical Engineering Technology) | 3 | A |
| Bachelor of Science in Electromechanical Engineering Technology | 3 | A |
| Linking Course Master of Science in Electrical Engineering Technology (main subject Automation) | 3 | A |
| Linking Course Master of Science in Electrical Engineering Technology (main subject Electrical Engineering) | 3 | A |
| Linking Course Master of Science in Electromechanical Engineering Technology | 3 | A |
| Preparatory Course Master of Science in Electrical Engineering Technology (main subject Automation) | 3 | A |
| Preparatory Course Master of Science in Electrical Engineering Technology (main subject Electrical Engineering) | 3 | A |
| Preparatory Course Master of Science in Electromechanical Engineering Technology | 3 | A |

Teaching languages
Dutch

Keywords
Speed control, torque control, scalar control, field oriented control, induction machines, DC machines, current control

Position of the course
The course on electromechanical drives 1 studies the operation of speed controlled electromechanical drive systems by means of electric machines. The power electronic converters are analyzed and the scalar control and field oriented control of induction machines is studied. The control of direct current machines is also treated. During the practical sessions, practical aspects related to the operation speed controlled machines and generators are discussed and measurements are performed.

Contents
Electromechanical drive systems 1
- Introduction
- Speed and torque control of a dc machine
- Four quadrant operation
- Control scheme's for dc drives
- Optimization of the controllers
- Speed and torque control of the induction machine
- Power electronics for speed control

(Approved)
• Scalar control
• Field oriented control
• Active infeed
• Direct torque control
• Traction applications
• Recent development in the research related to drive systems

**Practical sessions**

- Possibilities and limitations of scalar control
- Breaking possibilities of large inertias
- Optimal use of braking energy

Initial competences

The student has followed a basic course on electrical machines and understands the operation of induction machines.
The student has followed a course on control systems and a basic course on power electronics.

Final competences

1. The student is able to:
   - Describe the operation of power electronic converters used for the speed control of AC-machines.
2. Discuss the torque dynamics of speed controlled electric machines.
3. To install and tune a speed controlled drive.
4. To select and configure a proper speed controlled system with respect to a given application.
5. Analyze and present measurement results related to electromechanical drives.

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

Extra information on the teaching methods

During the lectures, the theoretical aspects are discussed and illustrated with industrial cases. In the practicum, the student performs experiments to improve his understanding.

Each student will elaborate 1 specified experiment in detail and present it for the entire class. This presentation is the basis for the continuous assessment of this course.

Learning materials and price

  Cost circa €30
- K. Stockman, Additinal notes on electromechanical drives 1, 2013, (Dutch)
  Cost circa €15
- S. Dereyne, B. Vanwalleghem, elektromechanische aandrijvingen - laboratorium, (Dutch)
  Cost circa €10

Supporting powerpoint slides are electronically available on minerva.

References


Course content-related study coaching

Questions related to the lectures can be raised after each lecture or an appointment can be made with the professor. Additional explanation is possible after each lab session.

Evaluation methods

end-of-term evaluation and continuous assessment

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

(Approved)
Oral examination

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

Oral examination

Examination methods in case of permanent evaluation

Participation

Possibilities of retook in case of permanent evaluation

examination during the second examination period is not possible

Extra information on the examination methods

Oral examination with written preparation for the evaluation of both theory and the practical aspects of this course.

Calculation of the examination mark

**Calculation final score**

Final score (/20) = C1xP1 + C2xP2

Cx are coefficients and Px are scores (/20) with:

P1 : score Theory

P2 : score Lab

C1 = 60%

C2 = 40% (of which 10% permanent evaluation which can not be retaken)

3 illegal absences during practical sessions can result in a score AFW (Not Present) for the complete partim.

**First and second examination period**

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.

The permanent evaluation can not be improved in the second examination.

Facilities for Working Students

Please contact the responsible teacher.