

## Advanced Drive Systems (E640200)

Due to Covid 19, the education and assessment methods may vary from the information displayed in the schedules and course details. Any changes will be communicated on Ufora.

<b>Course size</b>	<i>(nominal values; actual values may depend on programme)</i>			
<b>Credits 3.0</b>	<b>Study time 90 h</b>	<b>Contact hrs</b>	30.0h	
<b>Course offerings and teaching methods in academic year 2021-2022</b>				
A (semester 1)	Dutch, English	Kortrijk	lecture	18.0h
			practicum	12.0h
<b>Lecturers in academic year 2021-2022</b>				
Dereyne, Steve		TW08	staff member	
Vanwallegem, Bart		TW08	staff member	
De Kooning, Jeroen		TW08	lecturer-in-charge	
<b>Offered in the following programmes in 2021-2022</b>			<b>crdts</b>	<b>offering</b>
<a href="#">Master of Science in Machine and Production Automation Engineering Technology</a>			3	A

### Teaching languages

English, Dutch

### Keywords

Permanent magnet synchronous machines, switched reluctance machines, stepper motors, BLDC motors, linear motors, shaft synchronisation, servo drives

### Position of the course

This course discusses advanced electrical machines and drives.

### Contents

This course discusses the operation, modelling, use and control of:

- Permanent magnet synchronous machines (PMSM)
- Switched reluctance machines
- Stepper motors
- Linear motors
- Servo drives and shaft synchronisation

In the practical courses, the student gains experience with these electrical machines and the synchronisation of shafts.

### Initial competences

The student has followed the courses on variable speed drives.

### Final competences

- 1 Being able to explain the functioning, operation and control of permanent magnet synchronous machines, switched reluctance machines, stepper motors, linear motors and servo drives.
- 2 Set up a control system for synchronisation of multiple axes.

### 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

Practicum, Lecture

### 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.

### **Learning materials and price**

- J. De Kooning, Cursus Geavanceerde aandrijvingen, verspreid via de cursusdienst  
Kost circa € 20
- S. Dereyne, B. Vanwalleghem, Geavanceerde aandrijvingen - laboratorium, verspreid via de cursusdienst  
Kost circa €10
- Begeleidende presentaties worden elektronisch ter beschikking gesteld via the electronic learning platform

### **References**

1. Jan Melkebeek, 2018, Electrical Machines and Drives : Fundamentals and Advanced Modelling, Cham, Switzerland, Springer
2. Kristof Geldhof, 2010, Positie-sensorloze Sturing Van Geschakelde Reluctantiemotoren Door Excitatie Van Elektrische Eigenfrequenties, PhD Thesis, Universiteit Gent
3. Jasper De Viaene, 2020, Sensorless load angle detection for brushless direct current and stepping motors, PhD Thesis, Ghent University
4. Ramu Krishnan, 2009, Permanent Magnet Synchronous and Brushless DC Motor Drives. CRC Press
5. Ramu Krishnan, 2001, Switched Reluctance Motor Drives: Modeling, Simulation, Analysis, Design, and Applications, CRC Press
6. Ion Boldea, 2013, Linear Electric Machines, Drives, and MAGLEVs Handbook, CRC Press
7. Paul Acarnley, 2002, Stepping Motors: A guide to theory and practice, The Institute of Engineering and Technology (IET), London, United Kingdom

### **Course content-related study coaching**

Additional explanations can be obtained by making an appointment with the professor (via e-mail or after each lecture). Additional explanations can also be obtained after each practical course.

### **Assessment moments**

end-of-term assessment

### **Examination methods in case of periodic assessment during the first examination period**

Oral examination

### **Examination methods in case of periodic assessment during the second examination period**

Oral examination

### **Examination methods in case of permanent assessment**

### **Possibilities of retake in case of permanent assessment**

not applicable

### **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**

The assessment and the realization of the final quota is done via the permanent evaluation. Questions related to theoretical aspect count for 60% of the final score. Questions related to the practicum count for 40%. In order to pass for the course, at least 7/20 must be obtained for both parts, theory and practicum. If this condition is not met, the calculated score is deviated from if this is 10 or more and reduced to 9/20.

### **Facilities for Working Students**

Please contact the responsible teacher.