Technology
Arts Sciences
TH Köln

Course Manual EFA

Electric vehicle drivetrain

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General information

Long name	Electric vehicle drivetrain
Approving CModule	EFA_MaET
Responsible	Prof. Dr. Andreas Lohner Professor Fakultät IME
Valid from	summer semester 2021
Level	Master
Semester in the year	summer semester
Duration	Semester
Hours in self-study	78
ECTS	5
Professors	Prof. Dr. Andreas Lohner Professor Fakultät IME
Requirements	Fundamentals of electrical engineering power electronics Basics of electric drives Analogue signals and systems
Language	German
Separate final exam	Yes

Literature

Leonhard, W.: Regelung Elektrischer Antriebe, Springer Verlag

Wellenreuter, G.: Automatisieren mit SPS, Vieweg Verlag

Böker, J.: Geregelte Drehstromantriebe, Uni Paderborn

Gerling, D.: Elektrische Maschinen und Antriebe, B.W.-Uni München

Final exam

Details	By means of an oral exam, the learned contents and competencies are queried
Minimum standard	Purely content knowledge defines the limit of pass
Exam Type	EN mündliche Prüfung, strukturierte Befragung

− Lecture / Exercises

Learning goals

Goal type	Description
Knowledge	Basic concepts and historical drive development Mechanical fundamentals, rotating field theory, modeling Field-oriented control of the induction / synchronous machine Structure, function and control of the switched reluctance machine Further vehicle-specific controls Electric train and bus drives with project examples Hybrid and electric drive topologies with project examples Storage technologies for vehicles
Skills	Students will be able to capture the functionalities of a modern vehicle propulsion system (hybrid and electric vehicle). They know and understand the essential control concepts of the different topologies and are able to carry out simple closed-loop control simulations and to use this knowledge to convert the results to the drive. Students are able to design and dimension drive systems.

Special requirements

none

Accompanying material	Lecture slides as pdf document Exercises Drivetrain models Literature on the topic
Separate exam	No

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Exercises (whole course)	0
Exercises (shared course)	1
Tutorial (voluntary)	0

− Practical training

Learning goals

Goal type	Description
Knowledge	Recognize drive characteristics and properties and record them by measurement (analyze drive system)
Skills	Structure the system Define subsystems Define subsystem functions Create drivetrain model Design drive control Design energy management algorithms Understand commercial development tools and use them purposefully Put control on the target system into operation
Skills	Coping with complex tasks in a team Plan and control simple projects Comply with agreements and deadlines Plan and conduct reviews
Skills	The students learn methods for the dynamic description and regulation of hybrid and electric vehicle drives and thereby obtain decision-making authority. The students have experience in dealing with power electronics, drives, classic measuring devices and are able to model drivetrains with a simulation tool. Students have the ability to understand, dimension and control electric and hybrid drivetrains.

Special requirements

none

Accompanying material	guide for practical training
Separate exam	No

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	1
Tutorial (voluntary)	0