

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details						
Code				Academic Year		Semester
EBT412				3		5
Title				T	A	L ECTS
Electrical Machines				3	2	0 6
Language		German				
Level		Undergraduate	X	Graduate		Postgraduate
Department / Program		Energy Science and Technology				
Forms of Teaching and Learning		Face-to-face				
Course Type		Compulsory		Elective	X	
Objectives		The aim of this course is to understand how electric machines operate, to comprehend the structure and operating principles of synchronous and asynchronous machines, to analyze machine performance through calculations under different operating conditions, and to evaluate the results from a technical perspective.				
Content		The content of the course includes the physical principles of electromechanical energy conversion; three-phase systems and rotating magnetic fields; the structure, operation, and performance of DC machines; transformers; asynchronous machines; synchronous machines; AC motors; their application areas; the structure and fundamentals of drives; fundamentals of power electronics and motor control with drives.				
Prerequisites		None				
Coordinator						
Lecturer(s)						
Assistant(s)						
Work Placement		None				
Recommended or Required Reading						
Books / Lecture Notes		Elektrische Maschinen, R. Fischer, Springer Verlag, Berlin, 2013. Elektrische Maschienen und Antriebe, K. Fuest, P. Döring, Springer Verlag, Berlin, 2007 Elektrische Antriebe, D. Schröder, Regelung von Antriebssystemen, Springer Verlag, Berlin, 2015.				
Other Sources		Elektrische Antriebe in der Fahrzeugtechnik, G. Babel, Vieweg/Teubner, 2009.				
Additional Course Material						
Documents						
Assignments						

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Exams		1Midterm + 1Final		
Course Composition				
Mathematics und Basic Sciences			%	
Engineering		30	%	
Engineering Design		30	%	
Social Sciences			%	
Educational Sciences			%	
Natural Sciences			%	
Health Sciences			%	
Expert Knowledge		40	%	
Assessment				
Activity		Count	Percentage (%)	
Midterm Exam		1	40	
Quiz				
Assignments				
Attendance				
Recitations				
Projects				
Final Exam		1	60	
Total			100	
ECTS Points and Work Load				
Activity		Count	Duration	Work Load (Hours)
Lectures		14	3	42
Self-Study		14	3	42
Assignments		5	10	50
Presentation / Seminar Preparation				
Midterm Exam		1	2	2
Recitations		5	6	30
Laboratory				
Projects				
Final Exam		1	2	2
Total Work Load				168
ECTS Points (Total Work Load / Hour)				6
Learning Outcomes				
1	To gain knowledge about electric machines.			

2	To understand the structures and operating principles of Direct Current (DC) machines, transformers, asynchronous and synchronous machines								
Weekly Content									
1	Physical principles of electromechanical energy conversion								
2	Three-phase systems and rotating magnetic fields								
3	Structure, operation, and performance of DC machines								
4	Transformers								
5	AC motors; Application areas								
6	Structure and fundamentals of drives; Fundamentals of power electronics, motor control with drives								
7	Direct Current (DC) Machines								
8	Midterm Exam								
9	Direct Current (DC) Machines								
10	Fundamental Laws								
11	Fundamental Laws								
12	Synchronous Machines								
13	Synchronous Machines								
14	Asynchronous Machines								
15	Asynchronous Machines								
16	Final Exam								
Contribution of Learning Outcomes to Program Objectives (1-5)									
	P1	P2	P3	P4	P5	P6	P7	P8	P9
Ö1	3	3	3	3	3	3	3	3	3
Ö2	3	3	3	3	3	3	3	3	3
Contribution Level 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High									
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