DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Course Details						
Code				**Academic Year**		**Semester**
NWI206				2		**3**
Title				**T**	**A**	**L**	**ECTS**
Electrotechnik				2	1	2	6

Language	German					
Level	**Undergraduate**	**X**	**Graduate**		**Postgraduate**	
Department / Program	Energy Science and Technologies					
Forms of Teaching and Learning	Face to face					
Course Type	**Compulsory**	**X**	**Elective**			
Objectives	The student can master the administration of electrotechnical units and quantities, calculate constant electric and magnetic fields, and analyze linear direct current networks. Vector diagrams, three-phase current and basic semiconductor circuits will be calculated, as well as trip operations and complex alternating current networks.					
Content	Electrical fundamentals: Charging, electrical current, electrical voltage, electrical work and power DC currents: Ohm's law, terms in electrical networks, Kirchhoff's theorems, linear DC circuits, ideal and real sources, Superposition, alternative sources. Electric field: capacitor, forces in the capacitor Magnetic field: force in current-carrying conductors, Ohm's law magnetic circuit, law of flow, ferromagnetism, law of induction, self-induction, inductances in the electric grid, forces in the magnetic field Switching operations: First order differential equations, switching RC and LR elements on and off AC currents: voltage generation, definition of mean and effective value, complex calculation, Kirchhoff's laws for AC circuits, complex impedances, apparent power, active power, reactive power, filter networks, three-phase current. Transformer electronics: line mechanisms, semiconductor components, integrated circuits, electrically powered converters					
Prerequisites						
Coordinator						
Lecturer(s)	Dr. Sungur Aytaç					
Assistant(s)	Fuat Berke GÜL					
Work Placement	No					

Recommended or Required Reading	
Books / Lecture Notes	Hagmann, Gert: Grundlagen der Elektrotechnik. AULA-Verl., 2006
Other Sources	Hagmann, Gert: Aufgabensammlung zu den Grundlagen der Elektrotechnik. AULA-Ver., 2006 Frohne, Heinrich; Moeller, Franz: Grundlagen der Elektrotechnik. Teubner, 2005

Additional Course Material	
Documents	

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

Assignments		
Exams		
Course Composition		
Mathematics und Basic Sciences		20%
Engineering		30%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		40%
Health Sciences		%
Expert Knowledge		10%

Assessment

Activity	Count	Percentage (%)
Midterm Exam		40
Quiz		
Assignments		20
Attendance		
Recitations		
Projects	1	40
Final Exam		
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	15	2	30
Self-Study	15	4	60
Assignments	4	10	40
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	15	1	15
Laboratory	15	2	30
Projects			
Final Exam	1	2	2
		Total Work Load	**179**
		ECTS Points (Total Work Load / Hours)	**6**

Learning Outcomes

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES
COURSE SYLLABUS

1	Students will be able to recognize basic circuit elements and prepare circuit laws.
2	Students will be able to use basic circuit theorems in circuit analysis.
3	Students will be able to analyze linear circuits in time domain.
4	Students will be able to understand models of electronic circuit elements and use them in time-space analysis of electronic circuits.
5	
6	
7	
8	
9	
10	
11	
12	

Weekly Content	
1	Calculation in direct current (DC) circuits
2	Equivalent sources, superposition theorem
3	Inductance, coil, mutual inductance
4	Capacitance, capacitor
5	Behavior of RC and RL-circuits, step response
6	Sequential switching circuit, unlimited response Second order circuits, analysis of parallel RLC circuits
7	Analysis of serial RLC circuits
8	AC circuits, sinusoidal steady state analysis, impedance, admittance
9	Complex number calculations, phasor representation
10	Power factor, power transfer, efficiency
11	Single phase transformers, equations, equivalent circuits
12	Multiphase systems, symmetrical three-phase systems, power in three-phase systems
13	Multiphase systems, symmetrical three-phase systems, power in three-phase systems
14	
15	

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7
1	5	3					
2	3	4	4				
3	4	5	3				

DEPARTMENT OF ENERGY SCIENCE AND TECHOLOGIES

COURSE SYLLABUS

4	4	5	3				
5							
6							
7							
8							
9							
10							
11							
12							

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High
Compiled by:	Fuat Berke GÜL
Date of Compilation:	01.04.2024