

Module description: Materials for Electrical Engineering			
Module Code	t.BA.ET.MATTECH.19HS		
ECTS Credits	2		
Language of Instruction/Examination	German		
Organizational Unit	IMPE		
Module Coordinator	Dirk Penner		
Legal Framework	The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail.		
Module Characteristic	Type 1a 2 lecture lessons per semester week and class		
Module Description	Materials in Electrical Engineering Basics - Structures - Properties - Applications - Technology		
Module Content	<ul style="list-style-type: none"> • Introduction, motivation, basics: atoms, bonding, molecules, crystals, material classes • Crystal structures, alloys, phases, phase diagrams, real structures • Mechanical properties of materials: Young's modulus, strength, fracture toughness, hardness – metals, polymers, ceramics, composites • Specific resistivity, band model, Drude model, temperature dependence resistivity, conductor materials, compact conductors • Manipulation of conductivity by alloying, impurities, deformation, strip conductors, PCB, LTCC, soldering, contacts • Resistor materials, variable resistors (PTC, NTC, varistor), thermoelectrica • Band model for semiconductors, Fermi function, Arrhenius behavior, semiconductor materials: silicon, compound semiconductors, p,n doping, p,n contact • Diode, solar cell, LED, OLED, transistor • Semiconductor processing, manufacturing technology, chip production • Insulating materials, dielectrics, cables, fire protection, capacitor materials, designs • Superconductors, Piezo electrica • Magnetic materials, para-, dia-, ferromagnetism, magnetization curves, hard/soft magnets, ferrites • Electromotive force, electropotential series, galvanic cells and batteries • Accumulators, fuel cells, Faraday's law, electrolysis, electroplating, metallization 		
Prerequisite Knowledge	keine		
Learning Objectives (Competences)	Students...	Competencies	Taxonomies
	Students get to know process technologies for material applications in electrical engineering	F	K1, K2, K3
	Students understand how and why materials are used in technical applications due to their specific structures and physical properties	F	K1, K2, K3
	To become acquainted with materials and their properties and why they are used in industrial applications due to their electrical or related physical properties	F	K1, K2, K3

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Performance Assessment	End-of-module exam	Assessment	Length (min.)	Weighting	Form	
	written exam	Grade	90	100	acc. to module agreement	
	Performance assessment during the semester		Assessment	Length (min.)	Weighting	Form
	-		-	-	-	-
Classroom Attendance Requirement	None					
Learning material	<ul style="list-style-type: none"> Hoffmann, H. & Spindler, J. (2018). Werkstoffe in der Elektrotechnik. 8 Edition. Hanser. ISBN 978-3-446-45853-6. 					
Comments						