

Module title	SM Code	
Material Science	WT	
Module lecturer	Faculty	
Prof. Dr. Corinna Kaulen	Electrical Engineering and Information Technology	
Module language	Number of SWS / WSH	ETCS credits
English	3 SWS / WSH	3
Teaching format		
Seminar-based teaching with approx. 25-30% exercises		

Semester according to the study plan	
2 <sup>nd</sup> semester (Bachelor)	
Attendance/classroom hours	Additional independent study
42 hours	Preparation and follow-up work: 20 hours Exam preparation: 28 hours
Type of examination / Requirements for the award of the credit points	
Written exam: 90 minutes	

Teaching content
<b>Material structures:</b>
<ul style="list-style-type: none"> <li>• Atomic structure according to Bohr-Sommerfeld</li> <li>• Crystalline structures and their description</li> <li>• Lattice defects and their effects</li> <li>• Homogeneous and heterogeneous microstructures, phases</li> <li>• Alloys, phase diagrams</li> <li>• Description of amorphous structures</li> </ul>

**Material properties:**

- Mechanical properties
- Electrical properties
- Magnetic properties
- Thermal properties
- Optical properties

**Materials used in electrical engineering:**

- Conductor, resistor, and contact materials
- Semiconductor materials
- Dielectrics
- Magnetic materials
- Optical materials

**Learning objective: Professional competence****After successfully completing this module, students will be able to**

- describe the basic structure of materials (1) and explain its connection to material properties and functional mechanisms (2)
- describe the possibilities and limitations of optimizing and utilizing material properties under technical constraints (2)
- name the diverse materials used in electrical engineering and their further development (1)
- formulate material requirements using the relevant parameters and their limits (2), and evaluate them (3)
- select materials appropriate for specific applications (3)
- explain (1), evaluate (2) and discuss (3) material-based effects and functions of electrical engineering components

**Literature****Recommended reading**

- Fischer, H., Hofmann, H., & Spindler, J. (2007). *Werkstoffe in der Elektrotechnik*. Hanser-Verlag

- Ivers-Tiffée, E., & von Münch, W. (2007). *Werkstoffe der Elektrotechnik*. Vieweg+Teubner Verlag

The numbers in brackets indicate the levels to be achieved: (1)-know | (2)-can | (3)-understand and apply