

Module title		SM Code
Electrical Engineering 1.2		GE1.2
Module lecturer	Faculty	
Prof. Dr. Heiko Unold	Electrical Engineering and Information Technology	
Module language	Number of SWS / WSH	ETCS credits
English	4 SWS / WSH	5
Teaching format		
Seminar-based teaching with 10-15% practical component		

Semester according to the study plan	
2 nd semester (Bachelor)	
Attendance/classroom hours	Additional independent study
56 hours	Preparation and follow-up work: 58 hours Exam preparation: 36 hours
Type of examination / Requirements for the award of the credit points	
Written exam: 90 minutes	

Teaching content
Stationary magnetic field <ul style="list-style-type: none"> • Basic concepts of magnetic fields: source freedom, superposition principle, magnetic flux density and (linked) flux, permeability, magnetic field strength, magnetic dipole moment • Calculation of magnetic fields of coils and conductors using the law of flux and Biot-Savart's law, energy and forces of the magnetic field • Matter in magnetic fields and behavior of fields at interfaces • Calculation of magnetic circuits

Unsteady magnetic field

- Law of induction
- Inductance of coils and conductors
- Magnetically coupled coils
- Mutual inductance
- Coupling factors
- Switching processes in circuits with inductances

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

- understand the basic concepts and physical laws of direct current circuits (Kirchhoff's laws) (1)
- apply the knowledge they have acquired to solve known types of problems in the field of magnetic fields (2):
calculation of magnetic fields and the inductance of simple current curves, calculation of (un)branched magnetic circuits for given material characteristics
- solve previously unknown problems in the field of magnetic fields with an understanding of the underlying physical laws (3)

Literature**Recommended reading**

- Ida, N. (2013). *Engineering Electromagnetics*. Springer
- Hayt, W. H., & Buck, J. A. (2012). *Engineering Electromagnetics*. McGraw-Hill

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