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	
2nd 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

- 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
- use their understanding of the underlying physical laws to solve previously unknown problems in the field of magnetic fields (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