Valid from 2024.HS

Module description: Electricity 2

Module Code	t.BA.XX.EL2.19HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	ISC Signal & WCOM
Module Coordinator	Mathis Nussberger
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 3a 2 lecture lessons per semester week and class+ 2 lab bi-weekly lessons per semester and half-class
Module Description	The Electricity 2 module covers the impulse and alternating-current response of circuits comprising resistors, capacitors and inductors.
Module Content	• - Inductance, eddy currents, Lenz's law • - Self-inductance, energy in coils, connected coils, coupled coils (mutual inductance, without losses and cores) • - Switching behaviour of a coreless coil with and without wire resitance, switching behaviour of RL-circuits analyzed with Simulink, applications (current source, spark plugs, dc/dc boost converter) • - Single phase alternating current (AC): description of linear systems under harmonic excitation with complex number arithmetic (complex variables, impedance, admittance, real, reactive and complex apparent power) • - Frequency response of linear circuits of 1st and 2nd order: analysis of frequency response characteristic, Bode diagram (for 2nd order systems: resonance, Q factor/damping ratio) • - Behaviour of real electric circuit elements (resistors, capacitors, coils, transducers/transformer): AC models, losses and quality factor (Q-Factor), nonlinearities
Prerequisite Knowledge	https://gpmpublic.zhaw.ch/GPMDocProdDPublic/2_Studium/2_02_Grundlagen_Studium/T_CL_Modulauspraegungen_SM2025.pdf

Learning Objectives (Competences)

Students...	Competencies	Taxonomies
They can calculate and simulate the behaviour of harmonically excited, stationary oscillating, linear systems with adequate mathematical means, especially for alternating current systems.	F	K1, K2, K3
They are able to describe and calculate the switching behaviour of coils.	F, M	K1, K2, K3
They know about the most important aspects of real passive components and can select the appropriate types for a given application.	M, F	K1, K2, K3
They can analyse and describe mathematically the frequency response of these systems. They know the main frequency characteristics of simple systems and can relate them to their physical parameters.	M, F	K1, K2, K3
The students know about the elementary dynamic phenomenons and laws concerning inductance.	F	K1, K2
They are able to calculate the behaviour of alternating current circuits.	F, M	K2, K3, K4

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Performance Assessment

End-of-module exam	Assessment	Length (min.)	Weighting	Form
written exam	Grade	90	80	acc. to module agreement

Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
written exam	Grade	45	20	acc. to module agreement

Classroom Attendance Requirement	None
Learning material	
Comments	