Module description: Control Engineering

Module Code	t.BA.EU.RT.19HS
ECTS Credits	4
Language of Instruction/Examination	German
Organizational Unit	IEFE
Module Coordinator	Petr Korba
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 3b 2 lecture lessons per semester week and class+ 4 lab bi-weekly lessons per semester and half-class
Module Description	In this course, the fundaments of the classical control theory based on transfer functions are explained, incl. basic methods for stability analysis and controller synthesis.
Module Content	**Introduction, Open- & closed-loop control (sensors, actuators, steady state etc.)** **Modelling of dynamic systems** **Laplace Trasformation** **Transfer function** **Block diagramm algebra** **Stability of dynamic systems** **Analysis of systems 1st, 2nd & n-th order** **Frequency response** **Bode & Nyquist diagramms** **Nyquist stability criterion** **Principles of P, PI and PID controllers** **Tuning methods for PID-Controllers** **IMC Controller design (Internal Model Controller)** **Hurwitz stability criterion**
Prerequisite Knowledge	https://gpmpublic.zhaw.ch/GPMDocProdDPublic/2_Studium/2_02_Grundlagen_Studium/T_CL_Modulauspraegungen_SM2025.pdf

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Learning Objectives (Competences)	Students...	Competencies	Taxonomies
	Students are familiar with the basic principles of classical control system theory.	M, F	K1, K2
	They gain theoretical know-how and some practical experience with the most important controller class (PID) and are familiar with their tuning methods.	F, M	K3, K4
	They can determine the steady state and dynamical properties of a given system in practice.	F, M	K2, K3
	They have a practical knowledge of dynamic systems in the time & frequency domain (step response, Bode & Nyquist plots etc.) from the lab	M, F	K4, K5

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	60	20	acc. to module agreement

Classroom Attendance Requirement	None
Learning material	
Comments	