

<b>Module description: Electronics and Digital Technology for ST</b>	
<b>Module Code</b>	t.BA.ST.EDT.19HS
<b>ECTS Credits</b>	4
<b>Language of Instruction/Examination</b>	German
<b>Organizational Unit</b>	ISC Signal & WCOM
<b>Module Coordinator</b>	Mathis Nussberger
<b>Legal Framework</b>	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.
<b>Module Characteristic</b>	Type 3a  2 lecture lessons per semester week and class+ 2 lab bi-weekly lessons per semester and half-class
<b>Module Description</b>	Electronics and digital technology for systems engineering students
<b>Module Content</b>	<ul style="list-style-type: none"> <li>• Number systems (binary, hexadecimal)</li> <li>• Combinatorial logic: Logical operations, combinatorial logic, simplification of logical functions</li> <li>• Sequential logic: memory chips, flip-flops, synchronous circuits, counters, shift registers</li> <li>• Feedback circuits with ideal operational amplifiers</li> <li>• Coupled circuits with ideal operational amplifiers</li> <li>• Single supply operational amplifier circuits</li> <li>• Principle of the instrumentation amplifier, common mode rejection</li> <li>• Static and dynamic characteristics of PN, PIN and Schottky diodes</li> <li>• Function and characteristics of the MOS-FET</li> <li>• MOS-FET as circuit breaker</li> <li>• buck converter</li> <li>• H-bridge circuits</li> </ul>
<b>Prerequisite Knowledge</b>	None

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<b>Learning Objectives (Competences)</b>	<b>Students...</b>		<b>Competencies</b>	<b>Taxonomies</b>	
	The students can calculate, analyze and modify given circuits with ideal operational amplifiers.		F, M	K3, K4, K5	
	The students understand the simple digital basic blocks of combinatorial logic (NOT, AND, OR, XOR) and can use them in simple circuits.		M, F	K1, K2, K3	
	The students know the basics of combinatorial circuits and their description using truth tables		F	K1, K2	
	The students know how memory chips work and what they are used for (RS- and D-FF, counters, registers and shift registers).		F, M	K1, K2, K3	
	The students know the functionality of ideal operational amplifiers.		F	K1, K2, K3	
	The students understand the most important data sheet specifications of operational amplifiers.		F, M	K1, K2, K3	
	The students understand how signal rectifier circuits work.		F, M	K2, K3	
	The students know the static and dynamic behaviour of different types of diodes and know where they are used.		F, M	K1, K2	
	The students understand the single supply concept for operational amplifiers.		F	K1	
	The students know the problems of electromagnetic compatibility, the common and differential mode and the instrumentation amplifier		F	K1, K2	
	The students know how MOSFETs can be used as switches in step-down converters and what freewheeling diodes are needed for.		F	K1, K2	
	The students know how rectifier circuits work and can dimension them.		F, M	K2, K3	
The students can read and interpret a logic time diagram.		F, M	K1, K2, K3		
<b>Performance Assessment</b>	<b>End-of-module exam</b>	<b>Assessment</b>	<b>Length (min.)</b>	<b>Weighting</b>	<b>Form</b>
	written exam	Grade	90	100	acc. to module agreement
	<b>Performance assessment during the semester</b>		<b>Assessment</b>	<b>Length (min.)</b>	<b>Weighting</b>
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<b>Classroom Attendance Requirement</b>	None				
<b>Learning material</b>					
<b>Comments</b>	The module is based on "Electricity 1 & 2" and is a feeder for "Computer Technology 1&2", "Electrical and Drive Technology ST" and the elective module "Opto-Electronics".				