Module name											
Fundamentals of Communication						1					
Module nr.		Credit points	Workload 180 h	Self-study 120 h	Module duration	Module cycle					
Language		0.01	100 11	Module owner	1 101111	builliner term					
German				Prof. DrIng. Rol	f Jakoby						
1	 Teaching content Part 1 Fundamentals of Signal Transmission: Chap. 1 will be a brief introduction in "Electrical Information-and Communication Engineering", presenting signals as carrier of information, classifying electrical signals and describing elements of communication systems. Then, Chap. 2 introduces various line-conducted and wireless transmission media, power budget calculations for both media types, basics of antenna radiation and parameters etc., which will be emphasized by application examples like TV-satellite reception and mobile communication channels. Chap. 3 is focused on signal distortions and interferences, especially thermal noise, considering noisy two-port devices and its concatenations, lossy networks, antenna noise temperature and the impact of noise on analog and digital signals. This chap. ends with basics of information theory and channel capacity for AWGN-channels. In contrast, chap 4 deals with some fundamentals of noise-reduction and distortion-compensation techniques. Part 2 Digital Baseband-Signal Processing: Chap. 5 introduces sampling of band-limited signals and analog modulation of a pulse carrier (pulse-amplitude-, pulse-duration- and pulse-angle-modulation), which will be extended in chapter 6 on digital modulation in the baseband by means of pulse-code modulation (PCM), focusing on signal quantizing, analog-digital conversion, minimum bandwidth, bit error rate and error probability of a PCM word. At least, PCM-time-division multiplex and -systems will be discussed. Chap. 7 introduces band-limited inter-symbol interference-free transmission and matched filtering in the baseband. Part 3 Analog Radio Frequency (RF) Signal Processing: Chap. 8 deals with fundamentals of multiplex. and RE-modulation schemes as well as with frequency conversion frequency multiplication and mixing 										
	modulation of a sinus carrier will close this chapter. Chap. 9 introduces digital modulation of a harmonic carrier, including binary shift keying of a sinusoidal carrier in amplitude (ASK), phase (PSK) or frequency (FSK) as well as higher-order modulation schemes like M-PSK and M-QAM. At the end, there will be a comparison of the bandwidth and power efficiency of these modulation schemes. Then in chapter 10, a brief outlook on the functionality of channel coding and interleaving is given in order to assess the performances of digital communication systems, which requires most of the learned content of this lecture.										
2	Learning objectives Aim of the Lecture: To teach the fundamentals of communications (physical layer), primarily the transmission of signals from a source to a sink, possible modulation and access methods, signal distortion and noise as well as how to determine the performances of digital communication systems. The introduction of communications is a basement for further lectures like Communication Technology, Laboratories of Communication Technology (NTP A, B), Microwave Eng., Optical Communications and Mobile Communications.										
3	Recommended prerequisites for participation Deterministic Signals and Systems										
4	Form of exa DefaultMod • Defaul	mination ule exam: tModule exam (Tech	nical examination	, Examination, Del	faultDuration: 120 M	lin., Default RS)					
5	Prerequisite Passing the	e for the award of c	redit points								
6	Grading										

1	DefaultMadula avam								
	DefaultModule exam (Technical examination, Examination, Weighting: 100 %)								
7	Usability of the module								
	BSc ETiT, Wi-ETiT								
8	Grade bonus compliant to §25 (2)								
9	References								
	Complete Script and Literature:								
	Pehl, E.: Digitale und analoge Nachrichtenübertragung, Hüthig Verlag								
	Meyer, Martin: Kommunikationstechnik, Vieweg								
	Stanski, B.: Kommunikationstechnik								
	Kammeyer, K.D.: Nachrichtenübertragung. B.G. Teubner								
	Mäusl, R.: Digitale Modulationsverfahren. Hüthig Verlag								
	Haykin, S.: Communication Systems. John Wiley								
	Proakis, J., Salehi M.: Communication Systems Engineering. Prentice Hall								
	Ziemer, R., Peterson, R.: Digital Communication. Prentice Hall								
	• Cheng, D.: Field and Wave Electromagnetics, Addision-Wesley.								
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18-JK-1010-VI Fundamentals of Communications					1				
	Instructor		Туре		SWS				
	Prof. DrIng. Rol	f Jakoby	Lectur	re	3				
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	Prof. DrIng. Rolf Jakoby		Practi	ce	1				