

Data field	Explanation
Module number	M02
German title / English title	Fortgeschrittene Technologien der Signalübertragung / Advanced Signal Transmission Technologies
Credits	5 ECTS
Workload	51 contact hours (2 SWS SU + 1 SWS Ü), 99 hours of independent study
Subject coverage	Subject-specific specialization
Learning outcomes	Students have a deepened understanding of selected advanced signal transmission techniques used in present digital radio systems and fiber-optic transmission systems. Moreover, they can apply this knowledge in typical experimental signal transmission setups.
Requirements	Recommendation: Knowledge of basic signal transmission technologies
Level	1. Semester
Type of module	Seminar, Laboratory Training
Status	Required module
Semesters when offered	Winter semester
Method of assessment / Type of examination	The method of assessment / type of examination must be defined by the lecturer within the deadline determined in §19 (2) RSPO. Should the deadline pass without determination of the form of assessment in the module, the following method of assessment / type of examination applies: SU written examination (90 minutes), Ü Written laboratory report (10-15 pages) of the laboratory group with consultation (15-30 minutes)
Grade assessment	see study and examination regulations
Content	<ul style="list-style-type: none"> • Short review of aspects of digital communications engineering • Advanced modulation formats (Offset PSK, Differential PSK, $\pi/4$-DQPSK, continuous phase modulation, MSK, GMSK) • Coherent detection (homodyne, heterodyne and superheterodyne receiver) • BER performance of different modulation formats • Advanced receiver functions (clock recovery, equalization, carrier synchronization via PLL and frequency / phase estimation, channel estimation) • Advanced detection techniques (matched filter detection, maximum likelihood decoding) • Channel coding (mathematical treatment of block coding and convolutional coding) • Lab exercise (example): computer simulations and lab experiments with transmission systems using advanced modulation formats • Simulative and experimental evaluation of advanced receiver functions
Reading list	Proakis: Digital Communications, McGraw-Hill Kammeyer: Nachrichtenübertragung, Vieweg Werner: Nachrichtentechnik, Vieweg
Further information	Language employed in the module: English
Required Room type	SU-Sem, Ü-Lab