Data field	Explanation
Module number	WP04
German title / English title	Fortgeschrittene Methoden des Switching und Routing / Advanced Switching and Routing
Credits	5 ECTS
Workload	68 Contact hours (4 SWS Ü), 82 Hours of independent study
Subject coverage	Subject-specific specialization
Learning outcomes	Students know algorithms that perform shortest and optimal-path computations in multi-hop-networks. They understand roles, functions and design-principles of network-elements. They have a firm grasp on basic principles of network formation, the role of subnetting and the creation hierarchical network architectures. They can create and implement addressing plans (both for IPv4 and IPv6). They have a working knowledge in the configuration and troubleshooting of small and medium-sized network installations and understand methods of traffic-engineering in IP und Ethernet networks.
Requirements	none
Level	1./2. Semester
Type of module	Seminar, Laboratory Training
Status	Required-elective module
Semesters when offered	Every 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: Written examination
Grade assessment	See study and examination regulations
Equivalent modules	Modules with similar content

Content	• Routing-algorithms for different network architectures (RIP, OSPF, BGP)
	• Hard- and Software-architectures of modern routers and switches
	   o Content-Addressable Memory
	   o Fast-Path/Slow-Path,
	   o Data-/Control-/Management plane
	• Internet Architectural Model (peering, transit, Internet Exchanges)
	• QoS-mechanisms for guaranteed network performance
	• Traffic modelling in packet-switched networks
	• Multicast
	   o Protocols for local group management (IGMP)
	   o Multicast routing and distribution (PIM)
	• Routing und Switching in LAN- und MAN-Networks
	   o Network Address Translation
	   o Multi-Protocol Label Switching (MPLS)
	   o Traffic Engineering
	• Hands-on configuration of network infrastructures based on Cisco-routers
	   o RIP, OSPF, BGP
	   o Route-Redistribution
	• Configuration of QoS features such as Diffserv packet-marking and prioritisation of traffic-classes for multimedia data
	• Construction of routable IPv6 networks and virtualised network architectures (VLAN, SDN)

Reading list	D Medhi, K. Ramasamy: Network Routing, Morgan Kaufmann Andrew S. Tanenbaum: Computer Networks. Pearson Studium J. Kurose und K. Ross: Computer Networking. Pearson Studium
Further information	Language employed in the module: English
Required Room type	Ü-Sem, Ü-Lab