

Module name					
Operating Systems					
Module nr. 20-00-0903	Credit points 5 CP	Workload 150 h	Self-study 105 h	Module duration 1 Term	Module cycle Winter term
Language German			Module owner Prof. Dr. phil. nat. Marc Fischlin		
1	Teaching content - Introduction to Operating Systems (OS) - Role, purpose and design issues - Processes and Threads - OS structures, process control, abstractions, kernel/user modes and operations, context switching, interrupts - Inter-Process Communication - Message passing IPC, RPC, layers, interfaces, hierarchies - Coordination: Deadlocks - Process coordination, critical sections, deadlock characterization, deadlock detection and recovery, deadlock avoidance - Scheduling/Resource Management - Task ordering, preemptive and non-preemptive scheduling, schedulers and policies, OS implementations - Concurrency: Races, Mutual Exclusions - Critical sections, races, spin locks, synchronization - Programming Abstractions: Semaphores - Semaphores, Monitors - Memory Management - Storage structures, management/replacements approaches, virtual memory, paging, caching, segmentation - I/O - Device management, drivers, segmentation, interrupt handling, DMA - File systems - File systems requirements, design and implementation, file structures, directories, naming, partitions, virtual file systems - Fault Tolerance/Resilience - Fault types, fault handling approaches, reliable message delivery, OS reliability and availability, security issues - Embedded/RT OS - Memory/disk/performance management, recovery, fault-tolerances, real-time aspects - Distributed OS - Distributed computation and communication abstractions, synchronization, coordination, consistency - Virtual Machines - Purpose and types of virtualization, virtual file systems, Hypervisors				
2	Learning objectives Students will gain an overview on fundamental Operating System concepts consequent to their succesful course attendance. Students are able to discuss approaches to different concepts regarding various technical requirements such as fault tolerance, security and performance. Moreover, students acquire techniques for the creation of operating systems.				
3	Recommended prerequisites for participation Recommended: “Algorithmen und Datenstrukturen”, “Funktionale und objektorientierte Programmierung”, “Rechnerorganisation”				
4	Form of examination DefaultCourse related exam: <ul style="list-style-type: none">[20-00-0903-iv] (Technical examination, Oral/written examination, Default RS)				
5	Prerequisite for the award of credit points Pass exam (100%) Choosing this modul prohibits choosing Modul 20-00-0175 Operating Systems.				
6	Grading DefaultCourse related exam: <ul style="list-style-type: none">[20-00-0903-iv] (Technical examination, Oral/written examination, Weighting: 100 %)				
7	Usability of the module				

	B.Sc. Informatik B.Sc. Informationssystemtechnik May be used in other degree programs.		
8	Grade bonus compliant to §25 (2)		
9	References - Modern Operating Systems; A. Tanenbaum, Prentice Hall, ISBN 0-13-813459-6 - Operating System Concepts; Silberschatz et al, John Wiley and Sons, ISBN 0-470-23399-3		
Courses			
	DefaultCourse nr. 20-00-0903-iv	Course name Operating Systems	
	Instructor Prof. Dr.-Ing. Andreas Koch		Type Integrated course
			SWS 3