

Masterstudiengang Simulation Science an der RWTH Aachen

Compulsory Courses											
Modulverantwortliche	Dozenten	Modul	CP	V	ÜL	Σ SWS	Sommer / Winter	Σ CP	Σ SWS	Σ CP	Σ SWS
Koch	Koch	Applied Quantum Mechanics	6	3	3	6	w				
Carlson	Carlson/Rossotti	From Molecular to Continuum Physics I	6	3	2	5	w	20	17		
Roller	Roller	Numerical Methods for PDEs	3	4	2	6	w				
Pavoni	Pavoni	Computational Many-Body Theory	6	3	2	5	s	5	5		
Kobler	Kobler / Kufeln / Carlson	Data Analysis and Visualization	6	2	1	3	w	4	3		
May	May	Fast Iterative Solvers	3	2	1	3	s	4	3		
Sauer	Sauer	From Molecular to Continuum Physics II	6	3	2	5	s	5	5		
Mehmed	Mehmed / Reusken	Model Based Estimation Methods	3	2	2	4	s	5	4		
Behr	Behr	Parallel Computing in Simulation Science	6	2	1	3	s	6	3		
Wolf	Wolf	Parallel Programming I	6	3	2	5	w	6	5		
Bluge	Bluge	Quantum Theory of Materials	3	2	2	4	s	5	4		
Wolf	Wolf / Carlson / Roller / Koch	SSC Laboratory	6	3	3	3	w	6	3		

Elective Courses											
Modulverantwortliche	Dozenten	Modul	CP	V	ÜL	Σ SWS	Sommer / Winter	Σ CP	Σ SWS	Σ CP	Σ SWS
Energy Engineering											
Pischinger	Pischinger	Alternative Vehicle Propulsion Systems	3	2	1	3	s	5	3		
Pitsch	Pitsch / Hermshandra	Combustion I	3	2	1	3	s	4	3		
Pitsch	Pitsch / Hermshandra	Combustion II	3	2	1	3	w	5	3		
Sauer	Sauer	Computational Multiphysics	3	1	2	3	w	5	3		
Nabbs / Alekin	Nabbs / Alekin	Computational Nuclear Reactor Dynamics and Safety	3	2	1	3	s	4	3		
Nabbs / Alekin	Nabbs / Alekin	Computational Radiation Protection and Shielding	3	2	1	3	w	4	3		
Alekin / D. Müller	Alekin / D. Müller / et al.	Energy Economics	3	2	1	3	s	4	3		
Kreier	Kreier / Habermehl	Heat and Mass Transfer	3	2	2	5	w	7	5		
Pischinger	Pischinger	Internal Combustion Engine Fundamentals	3	2	1	3	w	4	3		
Pischinger	Pischinger	Internal Combustion Engine I	3	2	2	4	s	6	4		
Pischinger	Pischinger	Internal Combustion Engine II	3	2	2	4	w	6	4		
Leorhard	Leorhard	Molecular Thermodynamics	3	2	1	3	w	4	3		
Nabbs / Alekin	Nabbs / Alekin	Simulation Methods in Nuclear Engineering	3	2	1	3	s	4	3		
Behr	Behr	Simulation Sciences Seminar	3	2+1	0	3	sw	5	3		
Pitsch	Pitsch	Turbulent Flows	3	2	1	3	w	4	3		
Process Engineering											
Misao	Misao	Applied Numerical Optimization	3	2	2	4	w	4	4		
Wessling	Wessling	Chemical Process Engineering	3	2	1	3	s	6	3		
Misao	Misao	Computer-Aided Process Design	3	1	2	3	s	3	3		
Wessling	Wessling	Industrial Environmental Engineering	3	2	1	3	w	5	3		
Yoon	Yoon	Medical Process Engineering	3	2	1	3	s	4	3		
Wessling	Wessling	Membrane Processes	3	2	2	4	w	4	4		
Misao	Misao	Modern Technical Systems	3	2	1	3	s	6	3		
Wessling	Wessling	Product Design in Chemical Engineering	3	2	1	3	s	4	3		
Zang	Zang	Rheology	3	2	1	3	s	6	3		
Behr	Behr	Simulation Sciences Seminar	3	2+1	0	3	sw	5	3		
Pflöing	Jupke	Thermal Separation Processes	3	2	1	3	s	6	3		
Leorhard	Leorhard	Thermodynamics of Mixtures	3	2	1	3	w	4	3		
Control Engineering											
Lisaw	Lisaw	In-line Spectroscopy for Chemical Processes	3	2	1	3	s	3	3		
Eggle	Eggle / Krüning	Process Control Engineering	3	2	1	3	s	4	3		
Eggle	Eggle / Yu	Process Measurement	3	2	1	3	w	3	3		
Behr	Behr	Simulation Sciences Seminar	3	2+1	0	3	sw	5	3		
Fluid Mechanics											
Schröder	Schröder	Aero-Thermal Design of Space Transportation Systems	3	3	0	3	s	4	3		
Schröder	Schröder	Boundary-Layer Theory	3	2	1	3	s	3	2		
Schröder	Schröder / Meinke	Computational Fluid Dynamics I	3	2	1	3	s	4	3		
Schröder	Schröder / Meinke	Computational Fluid Dynamics II	3	1	1	2	w	3	2		
Behr	Behr	Finite Elements in Fluids	3	2	1	3	w	4	3		
May	May	Lattice-Boltzmann Methods	3	2	2	4	w	5	4		
Reinartz	Reinartz	Numerical Methods for Lubricated Contact Problems	3	2	1	3	w	5	3		
Jeschke, P., Benetschik	Jeschke, P., Benetschik	Numerische Integrationsverfahren für Strömungen in Turbomaschinen und Strahltriebwerken (NIST II)	3	2	2	4	w	6	4		
Behr	Behr	Simulation Sciences Seminar	3	2+1	0	3	sw	5	3		

Modulverantwortliche	Dozenten	Modul	CP	V	ÜL	Z	SWS	Sommer / Winter	Z CP	Z SWS
Structural Mechanics										
Sauer	Sauer	Computational Contact Mechanics	10	2	2	4	w	5	4	
Markert / Sauer	Sauer	Computational Modeling of Membranes and Shells	10	2	1	3	s	5	3	
Iskov	Iskov / Schmidt	Continuum Mechanics	10	2	2	4	s	6	4	
Corves	Corves / Almqvist	Dynamics of Multi-Body Systems	10	2	2	4	s	6	4	
Waste	Schmidt	Finite-Element Technology	10	2	1	3	s	6	3	
Schroder	Schroder	Fundamentals of Lightweight Design	10	2	2	4	w	5	4	
Falkhausen	Falkhausen / Brizong	Machine Design Process	10	2	3	5	w	6	5	
Corves	Hering / Vavrov	Machine Dynamics of Rigid Bodies	10	2	2	4	s	6	4	
Reese	Reese	Mechanics of Materials	10	2	2	4	w	5	4	
Reese, Behr, Sauer	Reese, Behr, Sauer	Nonlinear Finite Element Methods for Solids	10	4	0	4	s	5	4	
Schmidt	Schmidt	Nonlinear Structural Mechanics	10	2	1	3	s	5	3	
Reese	Reese	Plasticity and Fracture Mechanics	10	2	1	3	s	5	3	
Heider / Markert	Heider / Markert	Reliable Simulation in the Mechanics of Materials and Structures	10	2	2	4	s	6	4	
Behr	Behr	Simulation Sciences Seminar	10	2+1	0	3	sw	5	3	
Iskov	Iskov	Tensor Algebra and Tensor Analysis for Engineers I	10	2	2	4	w	5	4	
Iskov	Iskov	Tensor Algebra and Tensor Analysis for Engineers II	10	2	2	4	s	6	4	
Biomedical Engineering										
Schmitz-Rode	Schmitz-Rode	Basic Physics of Medical Imaging	10	2	2	4	s	6	4	
Schroder	Schroder / Klauas	Biological & Medical Fluid Mechanics I	10	2	1	3	s	5	3	
Schroder	Schroder / Klauas	Biological & Medical Fluid Mechanics II	10	2	1	3	w	3	3	
Jahren-Diechert	Jahren-Diechert	Cell Culture and Tissue Engineering	10	2	1	3	s	5	3	
Rademacher	Rademacher	Computer Assisted Surgical Technology	10	2	2	4	s	6	4	
Rademacher	Rademacher, de la Fuente Klein	Medical Software Engineering	10	1	2	3	s	4	3	
Rademacher	Rademacher / de la Fuente / Lauer	Medical Technology I	10	2	2	4	w	6	4	
Melnyk	Melnyk	Physiology	10	2	2	4	w	4	2	
Rademacher	Rademacher	Regulatorischer Rahmen für Medizinprodukte	10	1	3	4	sw	5	4	
Behr	Behr	Simulation Sciences Seminar	10	2+1	0	3	sw	5	3	
Schuppert	Schuppert	Systems Biology	10	2	2	4	w	3	2	
Production Engineering										
Schieferbaum	Schieferbaum	Additive Fertigungsverfahren 2	10	2	2	4	s	6	4	
Markert	Markert	Mechanics of Forming Processes	10	2	2	4	w	5	4	
Behr	Behr	Simulation Sciences Seminar	10	2+1	0	3	sw	5	3	
Communication Engineering										
Matthar	Matthar	Cryptography I	10	2	1	3	s	4	3	
Matthar	Matthar	Cryptography II	10	2	1	3	w	4	3	
Vary	Vary / Schmalen	Network Error Correction and Digital Modulation	10	2	1	4	s	4	4	
Vary	Vary / Anweiler / Pwaj	Information Theory and Source Coding	10	2	1	3	w	2	3	
Behr	Behr	Simulation Sciences Seminar	10	2+1	0	3	sw	5	3	
Materials Science										
Koch	Koch	Correlated Electrons	10	2	1	3	s	5	3	
Pischinger	Pischinger	Grundlagen des Paten- und Gebrauchsmusterverfahrens	10	2	2	4	w	5	4	
Behr	Behr	Simulation Sciences Seminar	10	2+1	0	3	sw	5	3	
Physics										
Winkler	Winkler	Advanced Molecular Dynamics Simulations	10	2	2	4	w	3	4	
N.A.	N.A.	Computational Quantum Theory for Strong Interactions	10	3	3	6	unregul.	10	6	
Koch	Koch	Correlated Electrons	10	2	1	3	s	5	3	
N.A.	N.A.	Introduction to Quantum Field Theory for Strong Interactions	10	3	3	6	unregul.	10	6	
Knoch	Knoch	Nanoelectronics Devices	10	2	1	3	w	5	3	
Terhal	Terhal	Quantum Information	10	4	2	6	s	10	6	
Knoch	Knoch	Quantum Simulation of Carbon Nanotube and Graphene Nanoribbon Field Effect Transistors	10	2	1	3	s	5	3	
Schoeller	Schoeller	Quantum Theory of Condensed Matter I	10	6	0	6	w	10	6	
Behr	Behr	Simulation Sciences Seminar	10	2+1	0	3	sw	5	3	
Winkler	Winkler	Structure and Dynamics of Macromolecules and Biopolymers	10	2	2	4	s	3	4	
Chemistry										
Drondowski	Drondowski	ab initio Phase Prediction of Solid State Materials	10	0	12	12	sw	10	12	
Martin / De Souza	Martin / De Souza	Atomistic Simulation of Defects in Solids	10	0	12	12	sw	10	12	
Leonhard	Leonhard	Combustion Chemistry	10	2	1	3	w	4	3	
Lehner	Lehner / Höscher	Computational Chemistry for the investigation and/or prediction of the properties of Homogeneous Catalysts	10	0	12	12	sw	10	12	
Lüchow	Lüchow	Computational Chemistry: Quantum Monte Carlo Methods	10	0	12	12	sw	10	12	
Klopper	Klopper	Computational Magnetism	10	0	12	12	sw	10	12	
Drondowski	Drondowski	Quantum-Chemical Modeling of Complex Intermetallics	10	0	12	12	sw	10	12	
Raabe	Raabe	Quantum-Chemical Modeling of Small and Medium-Sized Molecules	10	0	12	12	sw	10	12	
Engel	Engel	Simulation of Imperfections in Molecular Crystals	10	0	12	12	sw	10	12	
Behr	Behr	Simulation Sciences Seminar	10	2+1	0	3	sw	5	3	
Appell	Appell	Theory of Magnetic Resonance	10	2	0	2	w	4	2	

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Geosciences										
van der Kruk	van der Kruk	Heliogeophysics	3	2	0	2	w	3	2	
Hendricks-Franzen	Hendricks-Franzen	Acidemia flow and transport processes in terrestrial systems	3	1	1	3	w	4	2	
Behr	Behr	Qualitative Geologic Mapping	3	2	0	3	su	2	3	
Computer Sciences										
Ney	Ney	Advanced Automatic Speech Recognition	6	3	2	5	s	6	5	
Ney	Ney	Advanced Pattern Recognition Methods	6	3	2	5	o	6	5	
Ney	Ney	Advanced Topics in Statistical Natural Language Processing	6	3	2	5	o	6	5	
Bieninesi	Bieninesi	Automatic Generation and Analysis of Algorithms / High-Performance Matrix Computations	6	3	1	4	s	6	4	
Ney	Ney	Automatic Speech Recognition	3	1	2	6	w	6	6	
Kobbelt	Kobbelt	Basic Techniques in Computer Graphics	3	3	2	5	w	6	5	
Naumann	Naumann / Bischof / Blocker	Combinatorial Problems in Scientific Computing	3	2	1	3	s	4	3	
Noll	Noll	Complex Construction	3	3	2	5	w	6	5	
Naumann	Naumann	Computational Differentiation	3	3	1	4	w	6	4	
Kobbelt	Kobbelt	Computer Vision	3	3	1	4	w	6	4	
Naumann	Naumann / Varrak	Derivative Code Compilers	3	2	1	3	s	4	3	
Bieninesi	Bieninesi / Di Napoli	Functions of Matrices with Applications	3	3	1	4	s	6	4	
Kobbelt	Kobbelt	Geometry Processing	3	3	2	5	s	6	5	
Bieninesi	Bieninesi	High-Performance Matrix Computations	3	3	1	4	s	6	4	
Kowalski	Kowalski	Introduction to Embedded Software	3	3	2	5	s	6	5	
Bieninesi	Bieninesi	Languages for Scientific Computing	3	3	1	4	w	6	4	
Lichter	Lichter	Object Oriented Software Construction	3	3	2	5	w	6	5	
Ney	Ney	Pattern Recognition and Neural Networks	3	1	2	6	w	9	6	
M. Müller	M. Müller	Performance and Correctness Analysis of Parallel Programs	3	3	1	4	w	6	4	
Kobbelt	Kobbelt	Polynomial Curves and Surfaces	3	3	2	5	w	6	5	
Bieninesi	Bieninesi	Seminar: Topics in Automata, Compilers and Code-Generation	3	0	2	2	s	4	2	
Bieninesi	Bieninesi	Seminar: Topics in High-Performance and Scientific Computing	3	0	2	2	w	4	2	
Behr	Behr	Simulation Sciences Seminar	3	2	1	0	3	sw	5	3
Lichter	Lichter	Software Quality Assurance	3	3	3	5	s	6	5	
Ney	Ney	Statistical Natural Language Processing	3	4	2	6	s	6	5	
Kobbelt	Kobbelt	Subdivision Curves and Surfaces	3	3	2	5	s	6	5	
Kufan	Kufan	Virtual Reality	3	2	1	3	w	6	3	
Mathematics										
Frank	Frank / Vasquez	Advanced Topics in Transport Theory	3	2	1	3	s*w	5	3	
Dahmen	Dahmen / Esser	Approximation Theory and Data Analysis	3	4	2	6	w	9	6	
Bemelmans	Bemelmans / et al.	Calculus of Variations II	3	4	2	6	s	9	6	
Bemelmans	Bemelmans / et al.	Calculus of Variations I	3	4	2	6	w	9	6	
Wagner	Wagner / Zerp	Control Theory	3	4	2	6	s*w	9	6	
Müller-Peuge	Müller-Peuge / Wulken	Dynamical Systems	3	4	2	6	w	9	6	
Noelle	Noelle / et al.	Finite Element and Volume Techniques I	3	2	1	3	s	5	3	
Noelle	Noelle / et al.	Finite Element and Volume Techniques II	3	2	1	3	w	5	3	
Noelle	Noelle	Introduction to Hyperbolic Conservation Laws	3	2	1	3	sw	6	3	
Frank	Frank / Addege	Introduction to Transport Theory	3	2	1	3	s*w	5	3	
Frank	Frank	Inverse Problems: Computational and Statistical Methods	3	2	1	3	s	5	3	
Behr / Eggel	Behr / Eggel	Subgeometric Analysis	3	2	1	3	w	6	3	
Rouken	Dahmen / Rouken / Jarasch	Vector Solvers	3	1	2	6	s*	9	6	
Stamm	Stamm	Mathematical Aspects in Computational Chemistry	3	3	1	4	unregel.	6	4	
Torffhorst	Torffhorst	Mathematical Models in Science and Engineering (PMSE)	3	3	1	4	s	6	4	
Müller S.	Müller S.	Multiscale Techniques I	3	2	1	3	s	5	3	
Müller S.	Müller S.	Multiscale Techniques II	3	2	1	3	s	5	3	
Bemelmans	Bemelmans / et al.	Nonlinear Functional Analysis	3	4	2	6	o	9	6	
Dahmen / Rouken	Dahmen / Rouken / Noelle / Grassdyck	Numerical Analysis II	3	4	2	6	w	9	6	
Dahmen / Rouken	Dahmen / Rouken / Noelle / Grassdyck	Numerical Analysis IV	3	4	2	6	s	9	6	
Henry	Henry / Jorgen	Optimization A	3	4	2	6	s	9	6	
Trosch	Trosch	Optimization B	3	4	2	6	w	9	6	
Henry	Henry / Jorgen	Optimization C	3	4	2	6	s*	9	6	
Bemelmans	Bemelmans / et al.	Partial Differential Equations II	3	4	2	6	w	9	6	
Müller M.	Müller M.	Performance and Correctness Analysis of Parallel Programs	3	3	1	4	w	6	4	
Behr	Behr	Simulation Sciences Seminar	3	2	1	0	3	sw	5	3
Frank	Frank	Frank	3	2	1	3	s*w	5	3	
Other										
Pitsch	#NAME?	Pitsch								