

Masterstudiengang Simulation Science an der RWTH Aachen
02.11.2020

Compulsory Courses											
Modulverantwortliche	Dozenten	Modul	CP	V	Ü/L	Σ SWS	Sommer / Winter	Σ CP	Σ SWS	Σ CP	Σ SWS
Koch	Koch	Applied Quantum Mechanics	6	3	3	6	w	20	17	66	52
Carloni	Carloni/Rossetti	From Molecular to Continuum Physics I	6	3	2	5	w				
Roller	Roller	Numerical Methods for PDEs	8	4	2	6	w				
Pavarini	Pavarini	Computational Many-Body Theory	5	3	2	5	s	5	5		
Kobbelt	Kobbelt / Kühlen / Carloni	Data Analysis and Visualization	4	2	1	3	w	4	3		
May	May	Fast Iterative Solvers	4	2	1	3	s	4	3		
Sauer	Sauer	From Molecular to Continuum Physics II	5	3	2	5	s	5	5		
Mhamdi	Mhamdi / Reusken	Model Based Estimation Methods	5	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		
Blügel	Blügel	Quantum Theory of Materials	5	2	2	4	s	5	4		
Wolf	Wolf / Carloni / Roller / Koch	SiSc Laboratory	6	0	3	3	w	6	3		

Elective Courses													
Modulverantwortliche	Dozenten	Modul	CP	V	Ü/L	Σ SWS	Sommer / Winter	Σ CP	Σ SWS	Σ CP	Σ SWS		
Energy Engineering													
Pischinger	Pischinger	Alternative Vehicle Propulsion Systems	5	2	1	3	s	5	3				
Pitsch	Pitsch / Hemshandra	Combustion I	4	2	1	3	s	4	3				
Pitsch	Pitsch / Hemshandra	Combustion II	5	2	1	3	w	5	3				
Sauer	Sauer	Computational Multiphysics	5	1	2	3	w	5	3				
Nabbi / Allelein	Nabbi / Allelein	Computational Nuclear Reactor Dynamics and Safety	4	2	1	3	s	4	3				
Nabbi / Allelein	Nabbi / Allelein	Computational Radiation Protection and Shielding	4	2	1	3	w	4	3				
Allelein / D. Müller	Allelein / D. Müller / et al.	Energy Economics	4	2	1	3	s	4	3				
Kneer	Kneer / Habermehl	Heat and Mass Transfer	7	3	2	5	w	7	5				
Pischinger	Pischinger	Internal Combustion Engine Fundamentals	4	2	1	3	w	4	3				
Pischinger	Pischinger	Internal Combustion Engines: Design and Mechanics	6	2	2	4	s	6	4				
Pischinger	Pischinger	Internal Combustion Engines: Thermodynamics and Emissions	6	2	2	4	w	6	4				
Leonhard	Leonhard	Molecular Thermodynamics	4	2	1	3	w	4	3				
Nabbi / Allelein	Nabbi / Allelein	Simulation Methods in Nuclear Engineering	4	2	1	3	s	4	3				
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3				
Pitsch	Pitsch	Turbulent Flows	4	2	1	3	w	4	3				
Process Engineering													
Mitsos	Mitsos	Applied Numerical Optimization	4	2	2	4	w	4	4				
Wessling	Wessling	Chemical Process Engineering	6	2	1	3	s	6	3				
Mitsos	Mitsos	Computer-Aided Process Design	3	1	2	3	s	3	3				
Wessling	Wintgens	Industrial Environmental Engineering	5	2	1	3	w	5	3				
Wessling	Yüce	Medical Process Engineering	4	2	1	3	s	4	3				
Wessling	Wessling	Membrane Processes	4	2	2	4	w	4	4				
Mitsos	Mitsos	Modeling Technical Systems	6	2	1	3	s	6	3				
Wessling	Wessling	Product Design in Chemical Engineering	4	2	1	3	s	4	3				
Zang	Zang	Rheology	6	2	1	3	s	6	3				
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3				
Pfennig	Jupke	Thermal Separation Processes	6	2	1	3	s	6	3				
Leonhard	Leonhard	Thermodynamics of Mixtures	4	2	1	3	w	4	3				
Control Engineering													
Benigni	Benigni	Energy Systems Simulation	5	2	1	3	s	5	3				
Liauw	Liauw	Inline Spectroscopy for Chemical Processes	3	2	1	3	s	3	3				
Epple	Epple / Krüning	Process Control Engineering	4	2	1	3	s	4	3				
Epple	Epple / Yu	Process Measurement	3	2	1	3	w	3	3				
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3				
Fluid Mechanics													
Schröder	Schröder	Aero Thermal Design of Space Transportation Systems	4	3	0	3	s	4	3				
Schröder	Schröder	Boundary-Layer Theory	3	2	-	2	s	3	2				
Schröder	Schröder / Meinke	Computational Fluid Dynamics I	4	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	4	2	1	3	w	4	3				
May	May	Lattice-Boltzmann Methods	5	2	2	4	w	5	4				
Reinartz	Reinartz	Numerical Methods for Lubricated Contact Problems	5	2	1	3	w	5	3				
Jeschke, P.; Benetschik	Jeschke, P.; Benetschik	Numerische Integrationsverfahren für Strömungen in Turbomaschinen und Strahltriebwerken I (NIST I)	6	2	2	4	w	6	4				
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3				

Modulverantwortliche	Dozenten	Modul	CP	V	Ü/L	Σ SWS	Sommer / Winter	Σ CP	Σ SWS
Structural Mechanics									
Sauer	Sauer	Computational Contact Mechanics	5	2	2	4	w	5	4
Markert / Sauer	Sauer	Computational Modeling of Membranes and Shells	5	2	1	3	s	5	3
Itskov	Itskov / Schmid	Continuum Mechanics	6	2	2	4	s	6	4
Corves	Corves / Allmendinger	Dynamics of Multi Body Systems	6	2	2	4	s	6	4
Reese	Reese	Finite-Element-Technology	6	2	1	3	s	6	3
Schröder	Schröder	Fundamentals of Lightweight Design	5	2	2	4	w	5	4
Feldhusen	Feldhusen / Brezing	Machine Design Process	6	2	3	5	w	6	5
Corves	Hüsing / Ivanov	Machine Dynamics of Rigid Systems	6	2	2	4	s	6	4
Reese	Reese	Mechanics of Materials	8	3	2	5	w	8	5
Reese, Behr, Sauer	Reese, Behr, Sauer	Nonlinear Finite Element Methods for Solids	5	4	0	4	s	5	4
Schmidt	Schmidt	Nonlinear Structural Mechanics	5	2	1	3	s	5	3
Reese	Reese	Plasticity and fracture mechanics	6	2	1	3	s	6	3
Heider / Markert	Heider / Markert	Reliable Simulation in the Mechanics of Materials and Structures	6	2	2	4	s	6	4
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3
Itskov	Itskov	Tensor Algebra and Tensor Analysis for Engineers I	6	2	2	4	w	6	4
Itskov	Itskov	Tensor Algebra and Tensor Analysis for Engineers II	6	2	2	4	s	6	4
Biomedical Engineering									
Schmitz-Rode	Schmitz-Rode	Basic Physics of Medical Imaging	6	2	2	4	s	6	4
Schröder	Schröder / Klaas	Biological & Medical Fluid Mechanics I	3	2	1	3	s	3	3
Schröder	Schröder / Klaas	Biological & Medical Fluid Mechanics II	3	2	1	3	w	3	3
Jahnen-Dechent	Jahnen-Dechent	Cell Culture and Tissue Engineering	5	2	1	3	s	5	3
Rademacher	Rademacher	Computer Assisted Surgical Technology	6	2	2	4	s	6	4
Rademacher	Rademacher, de la Fuente Klein	Medical Software Engineering	4	1	2	3	s	4	3
Rademacher	Rademacher / de la Fuente / Lauer	Medical Technology I	6	2	2	4	w	6	4
Mottaghy	Mottaghy	Physiology	4	2	-	2	w	4	2
Rademacher	Rademacher	Regulatorischer Rahmen für Medizinprodukte	5	1	3	4	sw	5	4
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3
Schuppert	Schuppert	Systems Biology	3	2	-	2	w	3	2
Production Engineering									
Schleifenbaum	Schleifenbaum	Additive Fertigungsverfahren 2	6	2	2	4	s	6	4
Markert	Markert	Mechanics of Forming Processes	5	2	2	4	w	5	4
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3
Communication Engineering									
Mathar	Mathar	Cryptography I	4	2	1	3	s	4	3
Mathar	Mathar	Cryptography II	4	2	1	3	w	4	3
Vary	Vary / Schmalen	Forward Error Correction and Digital Modulation	4	3	1	4	s	4	4
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3
Materials Science									
Koch	Koch	Correlated Electrons	5	2	1	3	s	5	3
Pischinger	Pischinger	Grundlagen des Paten- und Gebrauchsmusterrechts	5	2	2	4	w	5	4
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3
Physics									
Winkler	Winkler	Advanced Molecular Dynamics Simulations	3	2	2	4	w	3	4
N.A.	N.A.	Computational Quantum Theory for Strong Interactions	10	3	3	6	unregel.	10	6
Sauer	Sauer	Computational Multiphysics	5	1	2	3	w		
Koch	Koch	Correlated Electrons	5	2	1	3	s		
N.A.	N.A.	Introduction to Quantum Field Theory for Strong Interactions	10	3	3	6	unregel.	10	6
Knoch	Knoch	Nanoelectronics Devices	5	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	5	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	5	2+1	0	3	sw	5	3
Winkler	Winkler	Statistics and Dynamics of Macromolecules and Biopolymers	3	2	2	4	s	3	4
Chemistry									
Dronskowski	Dronskowski	ab initio Phase Prediction of Solid State Materials	10	0	12	12	sw	10	12
Martin	Martin / De Souza	Atomistic Simulation of Defects in Solids	10	0	12	12	sw	10	12
Leonhard	Leonhard	Combustion Chemistry	4	2	1	3	w	4	3
Leitner	Leitner / Hölscher	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
Kögerler	Kögerler	Computational Magnetochemistry	10	0	12	12	sw	10	12
Dronskowski	Dronskowski	Quantum-Chemical Modeling of Complex Intermetallics	10	0	12	12	sw	10	12
Raabe	Raabe	Quantum-Chemical Modelling of Small and Medium-Sized Molecules	10	0	12	12	sw	10	12
Englert	Englert	Simulation of Interactions in Molecular Crystals	10	0	12	12	sw	10	12
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3
Appelt	Appelt	Theory of Magnetic Resonance	4	2	0	2	w	4	2

Modulverantwortliche	Dozenten	Modul	CP	V	Ü/L	Σ SWS	Sommer / Winter	Σ CP	Σ SWS
Geosciences									
van der Kruk	van der Kruk	Hydrogeophysics	3	2	0	2	w	3	2
Hendricks-Franssen	Hendricks-Franssen	Modeling flow and transport processes in terrestrial systems	4	1	1	2	s	4	2
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	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	0	6	5
Ney	Ney	Advanced Topics in Statistical Natural Language Processing	6	3	2	5	0	6	5
Bientinesi	Bientinesi	Automatic Generation and Analysis of Algorithms / High-Performance Matrix Computations	6	3	1	4	s	6	4
Ney	Ney	Automatic Speech Recognition	8	4	2	6	w	8	6
Kobbelt	Kobbelt	Basic Techniques in Computer Graphics	6	3	2	5	w	6	5
Naumann	Naumann / Bischof / Bucker	Combinatorial Problems in Scientific Computing	4	2	1	3	s	4	3
Noll	Noll	Compiler Construction	6	3	2	5	w	6	5
Naumann	Naumann	Computational Differentiation	6	3	1	4	w	6	4
Kobbelt	Kobbelt	Computer Vision	6	3	1	4	w	6	4
Naumann	Naumann / Varnik	Derivative Code Compilers	4	2	1	3	s	4	3
Bientinesi	Bientinesi / Di Napoli	Functions of Matrices with Applications	6	3	1	4	s	6	4
Kobbelt	Kobbelt	Geometry Processing	6	3	2	5	s	6	5
Bientinesi	Bientinesi	High-Performance Matrix Computations	6	3	1	4	s	6	4
Kowalewski	Kowalewski	Introduction to Embedded Software	6	3	2	5	s	6	5
Bientinesi	Bientinesi	Languages for Scientific Computing	6	3	1	4	w	6	4
Lichter	Lichter	Object Oriented Software Construction	6	3	2	5	w	6	5
Ney	Ney	Pattern Recognition and Neural Networks	8	4	2	6	w*	8	6
M. Müller	M. Müller	Performance and Correctness Analysis of Parallel Programs	6	3	1	4	w	6	4
Kobbelt	Kobbelt	Polynomial Curves and Surfaces	6	3	2	5	w	6	5
Trimpe	Trimpe	Seminar: Learning-based control	4	0	0	2	s u. w	4	2
Bientinesi	Bientinesi	Seminar: Topics in Automation, Compilers and Code-Generation	4	0	2	2	s	4	2
Bientinesi	Bientinesi	Seminar: Topics in High-Performance and Scientific Computing	4	0	2	2	w	4	2
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3
Lichter	Lichter	Software Quality Assurance	6	3	2	5	s	6	5
Ney	Ney	Statistical Natural Language Processing	8	4	2	6	s	8	6
Kobbelt	Kobbelt	Subdivision Curves and Surfaces	6	3	2	5	s	6	5
Kuhlen	Kuhlen	Virtual Reality	6	2	1	3	w	6	3
Mathematics									
Frank	Frank / Vasques	Advanced Topics in Transport Theory	5	2	1	3	s*w*	5	3
Dahmen	Dahmen / Esser	Approximation Theory and Data Analysis	9	4	2	6	w	9	6
Bemelmans	Bemelmans / et al.	Calculus of Variations II	9	4	2	6	s	9	6
Bemelmans	Bemelmans / et al.	Calculus of Variations I	9	4	2	6	w	9	6
Wigger	Wigger / Zerz	Control Theory	9	4	2	6	s*w*	9	6
Maler-Paape	Maler-Paape / Walcher	Dynamical Systems	9	4	2	6	w	9	6
Noelle	Noelle / et al.	Finite Element and Volume Techniques I	5	2	1	3	s	5	3
Noelle	Noelle / et al.	Finite Element and Volume Techniques II	5	2	1	3	w	5	3
Noelle	Noelle	Introduction to Hyperbolic Conservation Laws	6	2	1	3	ws	6	3
Frank	Frank / Alldredge	Introduction to Transport Theory	5	2	1	3	s*w*	5	3
Frank	Frank	Inverse Problems: Computational and Statistical Methods	5	2	1	3	s	5	3
Behr / Elgeti	Behr / Elgeti	Isogeometric Analysis	6	2	1	3	w	6	3
Reusken	Dahmen / Reusken / Jarausch	Iterative Solvers	9	4	2	6	s*	9	6
Stamm	Stamm	Mathematical Aspects in Computational Chemistry	5	3	1	4	unregel.	5	4
Torrilhon	Torrilhon	Mathematical Models in Science and Engineering (PDEs)	6	3	1	4	s	6	4
Müller S.	Müller S.	Multiscale Techniques I	5	2	1	3	s	5	3
Müller S.	Müller S.	Multiscale Techniques II	5	2	1	3	s	5	3
Bemelmans	Bemelmans / et al.	Nonlinear Functional Analysis	9	4	2	6	0	9	6
Dahmen / Reusken	Dahmen / Reusken / Noelle / Grasedyck	Numerical Analysis III	9	4	2	6	w	9	6
Dahmen / Reusken	Dahmen / Reusken / Noelle / Grasedyck	Numerical Analysis IV	9	4	2	6	s	9	6
Herty	Herty / Jongen	Optimization A	9	4	2	6	s	9	6
Triesch	Triesch	Optimization B	9	4	2	6	w*	9	6
Herty	Herty / Jongen	Optimization C	9	4	2	6	s*	9	6
Bemelmans	Bemelmans / et al.	Partial Differential Equations II	9	4	2	6	w	9	6
Müller M.	Müller M.	Performance and Correctness Analysis of Parallel Programs	6	3	1	4	w		
Behr	Behr	Simulation Sciences Seminar	5	2+1	0	3	sw	5	3
Frank	Frank	Frank	5	2	1	3	s*w*	5	3