

English-taught lectures at the Faculty of Mechanical Engineering

 Due to organizational modifications, the accuracy of this information may be subject to change. In case of any questions, please contact international@fb4.rwth-aachen.de

Course Name	Course of Study	ECTS	Winter Semester	Summer Semester	Language of Teaching	
					English	English/German
Ab initio Phase Prediction of Solid-State Materials	MSSiSc	10	irreg.	irreg.	x	
Adaptive Methods for Partial Differential Equations / Adaptive Methoden für Partielle Differentialgleichungen	MSCES, MSSiSc	6	irreg.	irreg.	x	
Adjoint Compilers	MSCES, MSVT	4	x			x
Advanced Analytics	MSWIMB	5	x		x	
Advanced Automatic Speech Recognition	MSSiSc	6		x	x	
Advanced Control Systems	MSAT	4	x		x	
Advanced Finite Element Methods for Engineers	MSMMECAME	5	x		x	
Advanced Molecular Dynamics Simulations	MSSiSc	3	x		x	
Advanced Pattern Recognition Methods	MSSiSc	6	x		x	
Advanced Software Engineering	MSAT, MSCAME, MSCES, MSMMECAME, MSPSE	5	x		x	
Advanced Topics in Statistical Natural Language Processing	MSSiSc	6	irreg.	irreg.	x	
Advanced Topics in Transport Theory	MSCES, MSSiSc	5	irreg.	irreg.	x	
Aerothermal Design of Space Transportation Systems	MSSiSc	4	x	x		x (depends on number of students)
Algorithmic Graph Theory / Algorithmische Graphentheorie	MSCES, MSVT	6	x		x	
Alternative and Electrified Vehicle Propulsion Systems / Alternative and Vehicle Propulsion Systems	MSAE, MSSiSc	5		x	x	
Applications of Laser Technology	MSAE	6		x	x	
Applied Automata Theory / Angewandte Automatentheorie	MSCES, MSVT	7		x	x	
Applied Molecular Thermodynamics / Angewandte molekulare Thermodynamik	MSAllgMB, MSCES, MSeNT, MSVT	4	x		x	
Applied Numerical Optimization / Angewandte numerische Optimierung	MSAllgMB, MSAT, MSCES, MSeNT, MSVT, MSSiSc	4	x		x	x (in MSSiSc)
Applied Quantum Chemistry for Engineers / Angewandte Quantenchemie für Ingenieure	MSCES, MSVT	4		x	x	
Applied Quantum Mechanics	MSSiSc	6	x		x	
Approval and Usability of Technical Medical Devices	MSSiSc	4	x			x (depends on number of students)
Approximation Theory and Data Analysis	MSSiSc	9	x	x		x (depends on number of students)
Atomistic Simulation of Defects in Solids	MSSiSc	10	irreg.	irreg.		x
Automatic Generation and Analysis of Algorithms	MSSiSc	6		x	x	
Automatic Speech Recognition	MSSiSc	8	x		x	
Automotive Engineering - Practical Course I & II	MSAE	6	x	x		x
Automotive Engineering III	MSAE	5	x		x	
Automotive System Evaluation	MSAE	5		x	x	
Automotive Software Engineering	MSVT	4		x		x
Basic Physics of Medical Imaging	MSSiSc	6		x	x	
Basic Techniques in Computer Graphics	MSCES, MSSiSc, MSVT	6	x		on request	
Biological & Medical Fluid Mechanics I	MSSiSc	3		x	x	
Biological & Medical Fluid Mechanics II	MSSiSc	3	x		x	
Boundary-Layer Theory	MSSiSc	3		x	x	
Calculus of Variations I	MSSiSc	9	x			x (depends on number of students)
Calculus of Variations II	MSSiSc	9		x		x (depends on number of students)
Chemical Process Engineering	MSSiSc	6		x	x	

Colloid Chemistry / Kolloidchemie	MSTVT, MSWIMB	4		x		x
Combinatorial Problems in Scientific Computing	MSCES, MSSiSc, MSVT	4	irreg.	irreg.	x	
Combustion and Gasification of Pulverised Fuel in a Mixture of Oxygen and Carbon Dioxide	BSCES, BSMB, BSWIMB, MSCES, MSeNT, MSVT, MSWIMB	3	x		x	
Combustion Chemistry	MSCES, MSeNT, MSSiSc, MSVT	4	x		x	
Combustion I	MSCAME, MSSiSc	5		x	x	
Combustion II	MSSiSc	5	x		x	
Compiler Construction / Einführung in den Compilerbau	BSCES	6	irreg.	irreg.		x
Compiler Construction / Einführung in den Compilerbau	MSSiSc	6	x			x
Composites	MSTexE	6		x	x	
Computational and Statistical Inverse Problems	MSCES	5		x	x	
Computational Chemistry for the investigation and/or prediction of the properties of Homogeneous Catalysts	MSSiSc	10	x	x		x
Computational Chemistry - Quantum Monte Carlo Methods	MSSiSc	10	x	x	x	
Computational Contact Mechanics	MSAllgMB, MSCES, MSSiSc, MSVT	5	x		x	
Computational Differentiation	MSCES, MSSiSc, MSVT	6	x			x
Computational Fluid Dynamics I	MSSiSc, MSCAME, MSTexE	4		x	x	
Computational Fluid Dynamics II	MSSiSc, MSCAME	3	x		x	
Computational Magnetochemistry	MSSiSc	10	x	x	x	
Computational Many-Body Theory	MSSiSc	5		x	x	
Computational Modeling of Membranes and Shells	MSAllgMB, MSCAME, MSCES, MSPT, MSSiSc	5		x	x	
Computational Nuclear Reactor Dynamics and Safety	MSSiSc	4		x	x	
Computational Quantum Theory for Strong Interactions	MSSiSc	10	irreg.	irreg.	x	
Computational Radiation Protection and Shielding	MSSiSc	4	x		x	
Computational Systems Biotechnology II	MSAllgMB, MSCES, MSSiSc, MSVT, MSWIMB	5	x			x
Computer Assisted Surgical Technology	MSSiSc	6		x		x (depends on number of students)
Computer Vision	MSCES, MSSiSc, MSVT	6	x		x	
Computer-Aided Process Design	MSSiSc, BSCES, BSMB, BSWIMB	3		x	x	x (depends on the students, SiSc)
Continuum Mechanics	MSAllgMB, MSCAME, MSCES, MSeuK, MSMMECAME, MSSiSc, MSVT	6		x	x	
Control Engineering	MSAE, MSCAME, MSPSE, MSTexE	5	x		x	
Control Theory	MSSiSc	9	irreg.	irreg.		x
Cooperative Product Design / Kooperative Produktentwicklung	MSeuK, MSWIMB	6		x	x	
Correlated Electrons	MSSiSc	5		x		x
Cryptography I	MSSiSc	4		x	x	
Cryptography II	MSSiSc	4	x		x	
Data Analysis and Visualization	MSSiSc, BSCES	4	x		x	
Data Mining Algorithms	MSCES, MSVT	4	x		x	
Derivative Code Compilers	MSSiSc	4		x	x	
Dynamic Systems for Computer Science Students / Dynamische Systeme für Informatiker	MSCES, MSVT	6	x			x
Dynamical Systems	MSSiSc	9	irreg.	irreg.		x (depends on number of students)
Dynamics of Multi Body Systems	MSSiSc	6		x	x	
Economics for Managers	MSMME, MSMMECAME	5	x		x	
Introduction to computational differentiation / Einführung in Computational Differentiation	BSCES	6	x			x
Introduction to Data mining algorithms / Einführung in Data-Mining Algorithmen	BSCES	6	x		x	
Basic Techniques in Computergraphics / Einführung in die Computergraphik	BSCES	6	x			x
Introduction to Software Quality Assurance / Einführung in die Software-Qualitätssicherung	BSCES	7		x		x
Introduction to Hyperbolic Conservation Laws	MSCES	6	x		x	

Einführung in Model-Checking / Introduction to Model Checking	BSCES	6		x		x
Electric Drives and Storage Systems	MSAE	5		x	x	
Embedded systems / Eingebettete Systeme	MSCES, MSVT	6		x		x
Energy from biofuels	MSAllgMB, MSeNT, MSVT	3	x		x	
Energy Systems Engineering	MSSiSc	5		x		x
Entrepreneurial Strategy	MSMME, MSMMECAME	5	x		x	
Environmental Sustainability in Transport Engineering	MSAE	6	x		x	
Factory Planning	MSMMECAME, MSPSE, MSTeX	6		x	x	
Failure of Structures and Structural Elements	MSAllgMB, MSCAME, MSCES, MSTeX, MSVT	5		x	x	
Fast Iterative Solvers	MSSiSc	4		x	x	
Finance and Accounting	MSMME, MSMMECAME	5		x	x	
Finite Element and Volume Techniques I	MSSiSc	5		x		x
Finite Element Methods for Engineers	MSCAME, MSTeX	5	x		x	
Finite Element Methods in Lightweight Design	MSCAME	5		x	x	
Finite Elemente und Volumenverfahren I	MSCES, MSVT	5		x		x
Finite Elemente und Volumenverfahren II	MSCES, MSVT	5	x			x
Finite Elements in Fluids	MSAllgMB, MSCES, MSSiSc	4	x		x	
Finite-Element-Technology	MSSiSc	6		x		x (depends on number of students)
Fluid Dynamics	MSTeX	5	x	x		
Forward Error Correction and Digital Modulation	MSSiSc	4		x	x	
Foundations of Finite Element Methods	BSCES,MSAE, MSAllgMB, MSCES, MSFzTuT, MSWIMB MSVT	5	x		x	
From Molecular to Continuum Physics I	MSSiSc	6	x		x	
From Molecular to Continuum Physics II	MSCES, MSSiSc	5		x	x	x (in MSCES)
Functions of Matrices with Applications	MSSiSc	6		x	x	
Fundamentals of Fluid Power (Hydraulics and Pneumatics)	MSAE	6	x		x	
Fundamentals of Lightweight Design	MSCAME, MSSiSc, MSTeX	5	x		x	
Fundamentals of Patent and Utility Model Law	MSSiSc	5	x		on request	x
Gear and Transmission Technology	MSAE, MSPSE, MSTeX	6	x		x	
Geometry Processing	MSCES, MSSiSc, MSVT	6		x		x
Global Illumination and Image-Based Rendering / Globale Beleuchtung und Image-based Rendering	MSCES, MSVT	6		x		x
Group Theory in Solid State Physics	MSSiSc	4	x		x	
Heat and Mass Transfer	MSSiSc	7	x		x	
Hierarchical Matrixes / Hierarchische Matrizen	BSCES	9	x			x
High-Performance Computing / Programmierung von Hochleistungsrechnern	MSCES, MSVT	4	irreg.	irreg.		x
High-Performance Fibres	MSTeX	6		x	x	
High-Performance Matrix Computations	MSCES, MSSiSc	8		x	x	
Hydrogeophysics	MSSiSc	3	x			x
In Situ Spectroscopy for Process Control / In situ-Spektroskopie zur Prozessführung	MSCES, MSVT, MSWIMB	3		x	x	
Industrial Engineering	MSAE, MSCAME, MSMME	6	x		x	
Industrial Engineering, Ergonomics and Work Organisation	MSCAME	5	x		x	
Industrial Environmental Engineering	MSSiSc	5	x			x (depends on number of students)
Industrial Logistics	MSMME, MSPSE, MSFzTuT, MSPT	5		x		x
Information Theory and Source Coding	MSSiSc	2	x		x	
Inline Spectroscopy for Chemical Processes	MSSiSc	3	x		x	
Innovation Management	MSMME, MSMMECAME	5		x	x	
Internal Combustion Engine Fundamentals	MSSiSc	4	x			x
Internal Combustion Engines I	MSSiSc, MSAE	6		x	x	x (in MSSiSc)
Internal Combustion Engines II	MSAE, MSSiSc	6	x			x

Introduction to Automatic Speech Recognition	MSCES, MSVT	6	x			x
Introduction to Embedded Systems	MSSiSc	6		x		x
Introduction to Hyperbolic Conservation Laws	MSSiSc	6	x		x	
Introduction to Pattern recognition and Neural networks / Einführung in die Mustererkennung und Neuronale Netze	MSCES, BSCES	6	x			x
Introduction to Quantum Field Theory for Strong Interactions	MSSiSc	10	irreg.	irreg.	x	
Introduction to Software Engineering / Einführung in die Softwaretechnik	MSAT, MSCES, MSVT	4	x			x
Introduction to Transport Theory	MSCES, MSSiSc	5		x	x	
iPodia - Global Innovation Processes	MSPT, MSWIMB	5	x		x	
Isogeometric Analysis	MSAllgMB, MSCES, MSSiSc	6		x	x	
Iterative Solvers	MSSiSc	9		x		x
Languages for Scientific Computing	MSSiSc	6	x		x	
Lattice-Boltzmann Methods	MSSiSc	5	x			x (depends on number of students)
Machine Design Process	MSPSE, MSSiSc, MSTexE	6	x		x	
Machine Design Process and Practical Applications of CAET	MSCAME	7	x		x	
Machine Dynamics of Rigid Systems	MSAE, MSSiSc	6	x (MSAE)	x (MSSiSc)	x	
Machine Tools	MSCAME, MSMME, MSPSE	5	x		x	
Machine Tools I	MSCAME	5	x		x	
Machine Tools II	MSCAME	5		x	x	
Manufacturing Technology I	MSCAME, MSMME	5	x		x	
Manufacturing Technology II	MSCAME, MSMME, MSMMECAME, MSPSE	6		x	x	
Marketing Management	MSMME, MSWIMB	5		x	x	
Mathematical Models in Atomistic Simulations / Mathematische Modelle in Atomistischen Simulationen	MSCES, MSSiSc	3		x	x	
Mathematical Models in Science and Engineering (PDEs)	MSSiSc	6		x	on request	x
Mathematical Theory of Finite Element Methods and Fast Iterative Solvers / Mathematische Theorie der Finite-Elemente-Methoden und schneller iterativer Löser	MSCES, MSSiSc	6		x	x	
Mechanics of Engineering Materials	MSMMECAME, MSCAME	5		x	x	
Mechanics of Forming Processes	MSAE, MSAllgMB, MSCAME, MSCES, MSEuK, MSFzTuT, PSPSE, MSSiSc, MSWIMB	5	x		x	
Mechanics of Living Tissues	MSAllgMB, MSCES	5	x		x	
Mechanics of Materials	MSSiSc	8	x		x	
Mechanics of Soft Engineering Materials: Rubbers, Textiles and Non-Crimp Fabrics	MSAllgMB, MSCAME, MSCES, MSEuK, MSKuTT,	3		x	x	
Mechatronics and Control Techniques for Production Plants	MSCAME, MSPSE	6	x		x	
Medical Process Engineering	MSSiSc	4		x	x	
Medical Technology I	MSSiSc	6	x			x (depends on number of students)
Membrane Processes / Membranverfahren	MSSiSc	4	x		x	
Micro- and Macrosimulation of Casting Processes	MSCAME	4	x		x	
Mobility Research and Transportation Modeling	MSAE	6		x	x	
Model Based Estimation Methods	MSSiSc	5		x	x	
Model Order Reduction Techniques	MSSiSc	9		x		x
Model Order Reduction Techniques in Structural Analysis	MSALLGMB, MSCES, MSLRT, MSSiSc	5		x	x	
Modeling Flow and Transport Processes in Terrestrial Systems	MSSiSc	4		x	x	
Modeling of Complex Chemical Reaction Networks	MSALLGMB, MSVT	4		x	x	
Modeling Technical Systems / Modellierung technischer Systeme	MSAllgMB, MSAT, MSCES, MSeNT, MSTKM, MSVT, MSWIMB	6		x	x	
Modeling, Model Reduction and Simulation in Laser Processing - Design	MSMMECAME, MSCAME	5		x	x	
Modeling, Model Reduction and Simulation in Laser Processing I	MSPSE	5		x	x	

Modeling, Model Reduction and Simulation in Laser Processing II	MSPSE	5	x		x	
Model Order Reduction Techniques / Modellreduktionsverfahren	BSCES	9	irreg.	irreg.		x
Molecular Mechanics and Multiscale Modelling of Materials	MSAE, MSAllgMB, MSCAME, MSCES, MSPSE, MSSiSc	5	x		x	
Molecular Thermodynamics	MSSiSc	4	x		x	
Multibody Dynamics	MSCAME, MSMMECAME, MSPSE	6		x	x	
Multigrid Methods / Mehrgitterverfahren	MSCES	5	irreg.	irreg.		x
Multiphase Flow	MSCES, MSSiSc	6	x		x	
Multiscale Techniques I	MSSiSc	5		x		x
Multiscale Techniques II	MSSiSc	5	x			x
Nonlinear Finite Element Methods for Solids	MSCES, MSAllgMB, MSPT, MSSiSc	5		x		x (depends on number of students)
Nonlinear Functional Analysis	MSSiSc	9		x		x (depends on number of students)
Nonlinear Structural Mechanics	MSAllgMB, MSCES, MSCAME, MSMMECAME, MSSiSc, MSTexE, MSVT	5		x	x	
Numerical Analysis III	MSSiSc	9	x			x
Numerical Analysis IV	MSSiSc	9		x		x
Numerical Methods for Fluid-Structure Interaction	MSSiSc	4	x		x	
Numerical Methods for Lubricated Contact Problems	MSAllgMB, MSCES, MSSiSc	5	x		x	
Numerical Methods for PDEs	MSSiSc	8	x		x	
Numerical Methods in Mechanical Engineering	MSAllgMB, MSCAME, MSMMECAME, MSTexE, MSVT, MSCES	7	x		x	
Object-Oriented Software Construction / Objektorientierte Softwarekonstruktion	MSCES, MSVT	6	x			x
Optimization A	MSSiSc	9		x		x (depends on number of students)
Optimization B	MSSiSc	9	x			x (depends on number of students)
Optimization C	MSSiSc	9		x		x (depends on number of students)
Parallel Computing in Simulation Sciences	MSSiSc	6		x	x	
Parallel Computing Methods in Computational Mechanics	MSAllgMB, MSCES	4		x	x	
Parallel Programming I	MSSiSc	6	x		x	
Parallel Programming II / Parallele Programmierung II	MSCES	6		x	x	
Parallele Algorithmen / Parallel Algorithms	MSCES, MSVT	4	irreg.	irreg.		x
Partial Differential Equations II	MSSiSc	9	x			x
Pattern Recognition and Neural Networks	MSSiSc	8	x		x	
Performance and Correctness Analysis of Parallel Programs	MSSiSc	6	x			x
Plasticity and Fracture Mechanics	MSSiSc	6		x		x (depends on number of students)
Porous Media Mechanics / Mechanik poröser Medien	BSMB, MSAE, MSAllgMB	6		x	x	
Practical Introduction to FEM-Software I	MSAllgMB, MSKuTT, MSCAME, MSCES, MSEuK, MSSiSc, MSTexE, MSWIMB	5	x		x	
Practical Introduction to FEM-Software II	MSAllgMB, MSEuK, MSCAME, MSKuTT, MSWIMB	5		x	x	
Process Chains for Replication of Complex Optical Component	MSPSE, MSPT	3		x	x	
Process Control Engineering	MSSiSc	4		x	x	
Process Measurement	MSSiSc	3	x		x	
Processes and Principles for Lightweight Design	MSAE	6	x		x	
Product Design in Chemical Engineering	MSSiSc	4		x	x	
Production Management	MSCAME	5	x		x	
Production Management A	MSMME	5	x		x	
Production Management B	MSMME, MSPSE	5		x	x	
Production Management II / Produktionsmanagement II	MSPT, LABBKFT	5		x		x

Production Metrology	MSCAME, MSPSE, MSTexE	5		x	x	
Quality Management	MSAE, MSCAME, MSMME, MSPSE, MSTexE	6	x		x	
Quantum Chemical Modelling of Small and Medium Sized Molecules	MSSiSc	10	irreg.	irreg.	x	
Quantum Information	MSSiSc	10		x	x	
Quantum Simulation of Carbon Nanotube and Graphene Nanoribbon Field-Effect Transistors	MSSiSc	5		x	x	
Quantum Theory of Condensed Matter I	MSSiSc	10	x		x	
Quantum Theory of Materials	MSSiSc	5		x	x	
Quantum-Chemical Modeling of Complex Intermetallics	MSSiSc	10	irreg.	irreg.	x	
Reliable Simulation in the Mechanics of Materials and Structures	MSAllgMB, MSCAME, MSMMECAME, MSSiSc, MS	6		x	x	
Renewable Fuels / Regenerative Brennstoffe	MSAllgMB, MSVT, MSeNT	5	x			x
Rheology	MSSiSc	6		x		x (depends on number of students)
Selected Topics of Inelasticity Theory / Ausgewählte Kapitel der Inelastizitätstheorie	BSMB, MSAllgMB, MSCAME, MSPSE	6	x		x	
Selected Topics of Turbomachinery / Ausgewählte Kapitel der Turbomaschinen	MSCES, MSeNT, MSWIMB	6	x			x
Seminar: Topics in Automation, Compilers and Code-Generation	MSSiSc	4		x	x	
Seminar: Topics in High-Performance and Scientific Computing	MSSiSc	4	x		x	
Seminar zur Computergestützten Mathematischen Modellierung	MSCES, MSSiSc	3		x		x
Simulation Methods in Nuclear Engineering	MSSiSc	4		x	x	
Simulation of Discrete Event Systems / Simulation ereignisdiskreter Systeme	MSCAME, MSMMECAME	5	x		x	
Simulation of Interactions in Molecular Crystals	MSSiSc	10	irreg.	irreg.	x	
Simulation Sciences Seminar	MSSiSc	5	x		x	
Simulation Techniques in Manufacturing Technology	MSCES, MSPT, MSWIMB	6	x		x	
Simulation und Optimierung in der Aerodynamik / Simulation and Optimization in Aerodynamics	BSCES	5	irreg.	irreg.		x
Simulationstechnik I,II / Simulation Methods in Engineering I,II	BSCES	6	x			x
SiSc Laboratory	MSSiSc	6	x	x	x	
Software Project Management / Software-Projektmanagement	MSCES, MSVT	7		x	x	
Special Topics in Fluid Mechanics / Sonderprobleme der Strömungsmechanik	MSFzTuT, MSLRT	3	x		x	
Statistical Natural Language Processing	MSSiSc	8		x	x	
Statistical Methods in Natural Language Processing / Statistical Natural Language Processing	MSCES, MSVT	6	irreg.	irreg.	x	
Statistics and Dynamics of Macromolecules and Biopolymers	MSSiSc	3		x	x	
Structural Design of Vehicles	MSAE, MSCAME	5		x	x	
Sustainable Manufacturing / Nachhaltige Fertigungstechnik	MSCES, MSPT, MSTKM	3		x	x	
Tensor Algebra and Tensor Analysis for Engineers I	MSALLGMB, MSCES, MSeuK, MSVT, MSWIMB	6	x		x	
Tensor Algebra and Tensor Analysis for Engineers II	MSALLGMB, MSCES, MSVT	6		x	x	
Tensor Algebra and Tensor Analysis for Engineering Students I / Tensor Algebra and Tensor Analysis for Engineers I	MSCAME	5	x		x	
Tensor Algebra and Tensor Analysis for Engineering Students II / Tensor Algebra and Tensor Analysis for Engineers II	MSCAME	5		x	x	
Theoretical Solid State Physics	MSSiSc	10	x		x	
Theory of Magnetic Resonance	MSSiSc	4	x		x	
Thermal Separation Processes	MSSiSc	6		x		x (depends on number of students)
Thermodynamics of Mixtures	MSSiSc	4	x			x (depends on number of students)
Thermodynamik I, II oder Thermodynamik I & Computer Simulation of Materials	BSCES	10	x			x
Seminar: Topics in Automation, Compilers and Code-Generation	MSSiSc	4		x	x	

Seminar: Topics in High-Performance and Scientific Computing	MSSiSc	4	x		x	
Tribology	MSAE, MSPSE	6	x		x	
Turbulent Flows	MSCES, MSeNT, MSSiSc, MSLRT, MSWIMB	4	x		x	
Ultra-Precision Technology I / Ultrapräzisionstechnik I	MSAllgMB, MSEUK, MSPT, MSWIMB	6		x	on request	x
Uncertainty Quantification	MSCES, MSSiSc	5	irreg.	irreg.	x	
Vehicle Acoustics	MSAE	5		x	x	
Virtual Reality	MSSiSc	6	x			x
Welding and Joining Technologies	MSCAME, MSMME, MSMMECAME, MSPSE	6		x	x	
Note: "irreg." means that these courses take place very irregularly and you need to check whether they are offered at the start of each semester.						