mögliche Kurse und Masterarbeitsthemen im Studiengang "Scientific Computing"

	Bereiche									
Masterarbeitsthemen	**Pflichtmodule Mathematik**	**Scientific Computing**	**Angewandte Mathematik**	**Anwendungsdisziplin**	**Bereich Anwendungen**	**Wahlpflichtbereich Mathematik**	**Wahlbereich**	**Mathematische Seminare**	**Forschungspraktikum**	**Zusatzmodule**
Robustness of Hybrid Discriminative-Generative Models	Numerische Mathematik für Ingenieurwissenschaften II **(10 LP)**	Numerische Mathematik für Ingenieurwissenschaften II **(10 LP)**	Nichtlineare Optimierung **(10 LP)**	Machine Learning I **(6 LP)**	Grundlagen der Strömungslehre / Strömungslehre I **(6 LP)**	Nichtlineare Optimierung **(10 LP)**	Energieseminar	Funktionalanalysis and Data Science **(6 LP)**	Forschungspraktikum **(7 LP)**	Rechnernetze und Verteilte Systeme **(6 LP)**
Simulation Compressible Fluids in the Dissipative Hamiltonian Framework **(30 LP)**	Scientific Computing **(10 LP)**	Numerische Mathematik II **(8 LP)**	Differentiell-Algebraische Gleichungen **(10 LP)**	Machine Learning I **(9 LP)**	Strömungslehre - Technik und Beispiele / Strömungslehre II **(6 LP)**	Variationsrechnung und Optimalsteuerung **(10 LP)**	Numerische Lineare Algebra I **(5 LP)**	High dimensional PDEs **(6 LP)**	Risk Management **(7 LP)**	Advanced Modelling in Sciences **(6 LP)**
A Machine Learning accelerated geophysical fluid solver **(30 LP)**	Numerical Linear Algebra **(10 LP)**	Numerische Mathematik II **(10 LP)**	Fortgeschrittene Themen der Algorithmischen Diskreten Mathematik - Industrial Data Science **(5 LP)**	Machine Learning 1-X **(12 LP)**	Energie-, Impuls- und Stofftransport A - I **(7 LP)**	Mathematisches Seminar - Algorithmic Game Theory **(6 LP)**	Mathematik für Physikerinnen und Physiker III/IV **(19 LP)**	Numerische Mathematik **(6 LP)**	Advanced Modelling in Science **(7 LP)**	Introduction to High Performance Computing **(6 LP)**
On Stable Finite-Difference Methods for Convection Problems on Wavelet Adaptive Block-Based Grids **(30 LP)**		Wissenschaftliches Rechnen **(7 LP)**	Einführung in die Lineare und Kombinatorische Optimierung (ADM I) **(10 LP)**	Machine Learning 2-X **(12 LP)**	Machine Learning 1-X **(12 LP)**	Mathematisches Seminar - Control and Optimization **(6 LP)**	Spanisch - Español con Fines Académicos C1 **(6 LP)**	COSSE Seminar **(6 LP)**	Theory and Methodology of Science with Applications **(7 LP)**	Signale und Systeme **(6 LP)**
Approximation of Koopman Operators Using Randomly Chosen Basis Functions **(30 LP)**		Numerische Lineare Algebra I + II	Martingales. Brownian Motion and Stochastic Calculus **(6 LP)**	Machine Intelligence I **(6 LP)**	Machine Learning 2-X **(12 LP)**	Matrix Theory **(10 LP)**	Machine Learning using Python: Theory and Application **(5 LP)**	Project Numerical Analysis **(6 LP)**	Literature Study **(7 LP)**	Machine Learning 2 **(9 LP)**
An application of a neural network approach for high-dimensional optimal control to an unstable reaction-diffusion equation **(30 LP)**		Numerische Lineare Algebra I **(5 LP)**	Mathematical Systems Theory **(8 LP)**	Machine Intelligence II **(6 LP)**	Quantum Computing **(6 LP)**	COSSE-Seminar **(6 LP)**	Program Construction in C++ for Scientific Computing **(8 LP)**	Mathematisches Seminar **(6 LP)**	Mesoscopic Physics **(7 LP)**	Object Oriented Scientific Programming with C++ **(3 LP)**
Evaluation of Deep Learning Approaches for Predicting Electric Vehicle Energy Demand and Charging Statoin Occupancy **(30 LP)**		Numerische Lineare Algebra II **(5 LP)**	Statistical Inference **(6 LP)**	Modern Methods of Statistical Learning **(8 LP)**	Compiler Design **(6 LP)**	Mathematical Modeling of Biological Systems **(9 LP)**	TU Berlin for Future - Die Ringvorlesung zum Klimaschutz, Teil 1 **(3 LP)**	Stochastische Partielle Differentialgleichungen **(6 LP)**		Perturbation Methods **(6 LP)**
Explaining Turbulence Predictions frm Deep Neural Networks: Finiding Important Features with Approximate Shapley Values **(30 LP)**		Differentiell-Algebraische Gleichungen **(10 LP)**	Non-linear Differential Equations **(6 LP)**	Tensor Algebra and Calculus (for Beginners and at Intermediate Level)	Computational Chemistry **(8 LP)**		TU Berlin for Future - Die Ringvorlesung zum Klimaschutz, Teil 2 **(3 LP)**	Machine Learning for Invserse Problems **(6 LP)**		Advanced Numerical Methods **(6 LP)**
Simulation of the temperature and magnetic field inside a camera for electron diffraction images **(30 LP)**		Introduction to High Performance Computing **(6 LP)**	Applied Finite Elements **(6 LP)**	Webtechnologien **(6 LP)**			Differentialgleichungen II A **(5 LP)**	Nichtlineare Optimierung **(6 LP)**		Scientific Computing **(6 LP)**
Simulations of a self-stabilizing fully submerged hydrofoil **(30 LP)**		Object Oriented Scientific Programming with C++ **(3 LP)**	Finanzmathematik **(10 LP)**	Systemprogrammierung **(6 LP)**			Praktische Datenanalyse mit R-Deskriptive und induktive Statistik (für Fortgeschrittene) **(5 LP)**	Optimal Transport **(6 LP)**		Elektrische Netzwerke **(6 LP)**
Computing Resonant States of a Quantum Mechanical Three-body problem on Supercomputers **(30 LP)**		Numerik Partieller Differentialgleichungen **(10 LP)**	Numerische Lineare Algebra I / Numerical Linear Algebra (**5 LP)**	Computational Finance **(6 LP)**			English for Academic Purposes C1 **(6 LP)**	Diskrete Optimierung und Machine Learning **(6 LP)**		Computer Modeling, Simulation, and Control of Renewable Energy Systems **(6 LP)**
Immersed Divergence-Conforming Finite Element Spaces **(30 LP)**		Numerical Methods for Engineers 2 **(10 LP)**	Numerische Lineare Algebra II **(5 LP)**	Grundlagen wissenschaftlicher Programmierung **(9 LP)**			Mathematisches Seminar - Nichtlineare Optimierung **(6 LP)**	Control and Optimization **(6 LP)**		Netze der elektrischen Energieversorgung **(6 LP)**
Generative Adversarial Deep Learning for Entropic Optimal Transport **(30 LP)**		Differentialgleichungen II A **(5 LP)**	Variationsrechnung und Optimalsteuerung **(6 LP)**	Foundation of Data Science **(10 LP)**			Praktikum **(6 LP)**			Planung und Schutz von Smart Grids **(6 LP)**
Towards Robust Solvers for Nuclear Fusion Simulations using JOREK: A numerical analysis Perspective **(30 LP)**		Differentialgleichungen II B **(5 LP)**	Variationsrechnung und Optimalsteuerung **(10 LP)**	Numerische Thermo- und Fluiddynamik - Wissenschaftliche Vertiefungen (CFD 3) **(6 LP)**			Introduction to Hig Performance Computing **(6 LP)**			
Improved Machine Learning Methods for Parameter Estimation of Ordinary Differential Equations **(30 LP)**		Introduction to Quantum Information and Computing **(6 LP)**	Mathematische Visualisierung I **(10 LP)**	Numerische Thermo- und Fluiddynamik - Grundlagen (CFD 1) **(6 LP)**			Special Topics in Computational Science and Engineering **(6 LP)**			
Numerical Methods for Electrolytes in Nanopores with Charged Walls **(30 LP)**		Nichtlineare Optimierung **(10 LP)**	Modellierung mit Differentialgleichungen **(10 LP)**	Probabilistic and Bayesian Modelling in ML and AI **(6 LP)**			Mathematisches Seminar - Optimal Transport and NNs **(6 LP)**			
Linear Eigenvalue Problems in Quantum Chemistry **(30 LP)**		Kontrolltheorie **(10 LP)**	Optimalsteuerung bei partiellen Differentialgleichungen **(10 LP)**	Softwaretechnik und Programmierparadigmen **(6 LP)**			Machine Learning 2-X **(12 LP)**			
Deep Learning for Temporal Super-resolution of 4D Flow MRI **(30 LP)**		Program Construction in C+++ for Scientific Computing **(8 LP)**	Linear Algebra and Optimization for Machine Learning **(6 LP)**	Kognitive Algorithmen **(6 LP)**			Deutsch als Fremdsprache für Studierende A1 **(6 LP)**			
Development of synthesizability-constrained molecular generation using deep learning **(30 LP)**		Infinite-dimensional control theory **(10 LP)**	Kontrolltheorie **(10 LP)**	Machine Learning, Advanced Course **(8 LP)**			Project Numerical Analysis **(6 LP)**			
Numerical Solutions of the Quadratic Static Team Decision Problem **(30 LP)**			Numerik Partieller Differentialgleichungen **(10 LP)**	System Engineering **(8 LP)**			Advanced Individual Course in Scientific Computing **(6 LP)**			
			Machine Learning 1-X **(12 LP)**	Program Construction in C++ for Scientific Computing **(8 LP)**			Forschungspraktikum - Molecular Modeling **(8 LP)**			
			Artificial Neural Networks and Deep Architectures **(8 LP)**	Automatic Image Analysis **(6 LP)**			Systems Engineering **(8 LP)**			
			Differentialgleichungen II A **(5 LP)**	Special Topics in Computational Sciences and Engineering **(6 LP)**			Machine Learning, Advanced Course **(8 LP)**			
			Differentialgleichungen II B **(5 LP)**	Computational Fluid Dynamics **(6 LP)**			Image Proessing for Remote Sensing **(6 LP)**			
				Applied Finite Elements **(6 LP)**						
				Vertiefungen Nichtlineare Plasmaphysik **(6 LP)**						
				A Seminar / Literature Study worth 12 credits **(12 LP)**						
				Numerische Realität **(6 LP)**						

Stand: 17.01.24

Masterarbeitsthemen	Pflichtmodule Mathematik	Scientific Computing	Angewandte Mathematik	Anwendungsdisziplin	Bereich Anwendungen	Wahlpflichtbereich Mathematik	Wahlbereich	Mathematische Seminare	Forschungspraktikum	Zusatzmodule
				Renewable Energy Technology in Electric Networks **(6 LP)**						
				Introduction to Engineering Data Analytics with R **(6 LP)**						
				Risk and Uncertainty **(6 LP)**						
				Kritische Nachhaltigkeit **(6 LP)**						
				Medical Image Processing **(6 LP)**						
				Artificial Neural Networks and Deep Architectures **(8 LP)**						
				Machine Learning **(8 LP)**						
				Machine Learning Lab Course **(9 LP)**						
				Digital Image Processing **(6 LP)**						
				Mathematics of Machine Learning **(6 LP)**						