

Overview CSiS Curriculum based on Examination Regulations 2020 (3rd amendment from 13.11.2023)

Compulsory Subjects (Pflichtbereich)

Semester	Computer Simulation	Computer Science	Numerical Methods		
1 (Winter Semester) 28 CP	Computer Simulation 1* 11 CP Lab Course I 150h AND Introduction to Computer Simulation 120h AND Block Course on Mathematical Foundations 60h	Computer Science 1 9 CP Modern Programming 180h AND Virtualization I 90h or Introduction to HPC 90h	Numerical Methods 1 8 CP NM1: Numerical Analysis and Simulation I 240h	Numerical Methods 1 8 CP NM1a: Numerics of Ordinary Differential Equations with components: a + b or a + c 240h	MathML 8 CP MatML: Mathematical Machine Learning 240h
2 (Summer Semester) 24 CP / 28 CP	Computer Simulation 2 13 CP Data Analysis 150h AND Parallel Algorithms 240h	Computer Science 2 3 CP Tools 90h or	Computer Science 2 3 CP Tools 90h or	Computer Science 2 7 CP Bayesian Learning 210h	Numerical Methods 2 8 CP Numerical Methods 2a: Numerical Analysis and Simulation II 240h or Numerical Methods 2b: Numerical Methods in Classical Field Theory and Quantum Mechanics 240h
3 (Winter Semester) 22 CP / 18 CP	Computer Simulation 3* 12 CP Introduction to Computer Simulation II 120h AND Lab Course II 240h	Computer Science 2 (contd.) 4 CP Image Processing and Data Visualization 120h	Computer Science 2 (contd.) 4 CP Virtualization II 120h	Numerical Methods 3 6 CP Numerical Linear Algebra 180h	

Table 1: Overview CSiS Curriculum: Compulsory Subjects

*final module exam with limited repeatability: 3 attempts in total

Overview CSiS Curriculum: Elective Subjects (Wahl-Pflichtbereich)

Semester	Atmospheric Physics	Computational Electromagnetics	Computational Finance	Computational Fluid Mechanics
1 (Winter Semester)				
2 (Summer Semester)	AtmP1 8 CP Summer School on Chemistry and Dynamics of the Atmosphere (Jülich) 150h 8 CP Selected Topics in Atmospheric Physics 90h or Atmospheric Modelling 90h	CEM1 8 CP Computational Electromagnetics 1 240h	CompFin1 8 CP Computational Finance 1 240h	CFM1.1* 4 CP Computational Fluid Dynamics 120h Optional subject (choice of two within CFM2, 4a, 4b, 5, 6 and 7): 4 CP CFM5: Fire Simulation 120h
3 (Winter Semester)	EAP /AtmP2b 8 CP EAP: Introduction to Atmospheric Physics 240h or 8 CP AtmP2b: Selected Topics in Atmospheric Physics 150h Seminar on Atmospheric Physics 90h	CEM2 8 CP Computational Electromagnetics 2 240h (CEM-Lab Project)	CompFin2 8 CP Computational Finance 2 240h	CFM1.2* 4 CP Radiative Heat Transfer 120 h Optional subjects (choice of two within CFM2, 4a, 4b, 5, 6 and 7): 4 CP each CFM2: Pedestrian Dynamics 120h CFM4a: Hydrodynamics 120h CFM4b: Modelling Choices in Transportation 120h CFM6: Machine Learning for Fire Simulation 120h CFM7: Modelling and Meshing of Complex Appl. w/ OpenFOAM 120h
4 (Summer Semester) 30 CP	Master Thesis 30 CP**			

Table 2: Overview CSiS Curriculum: Elective Subjects (cont.)

*CFM1.1: final module exam with limited repeatability: 3 attempts in total; exam registration only possible if the module CSim1 has been successfully passed.

*CFM1.2: final module exam with limited repeatability: 3 attempts in total; exam registration only possible if the modules CSim1 and CFM1.1 have been successfully passed.

** CFM: module exams CFM1.1 and CFM1.2 must have been successfully passed for registration of Master Thesis.

Overview CSiS Curriculum – Wahl-Pflichtbereich / Elective Subjects

Semester	Detector Physics	Imaging in Medicine	Molecular and Materials Modelling	Theoretical Particle Physics
1 (Winter Semester)				
2 (Summer Semester) 8 CP	PDP Particle Detector Project 8 CP 240h	IMG1 Quantitative Medical Imaging 4/8 CP 120h	MMM1 Molecular and Materials Modelling 1 8CP 240h	SMTP /SFT /VTT 8 CP SMTP: The Standard Model of Elementary Particle Physics 240h or SFT: Statistical Field Theory 240h or VTT: Many Particle Theory 240h or EQFT: Introduction to Quantum Field Theory 240h
3 (Winter Semester) 8 CP	DET DET: Detector Physics 8 CP 240h	IMG1 TPDP-a Detector Physics + TPDP-b Exercises Detector Physics 120h IMG2 IMG2: Image Processing and Data Visualization + Seminar 240h 8 CP	MMM2 Molecular and Materials Modelling 2 8 CP 240h	COS /EQFT /FQM 8 CP COS: Introduction to Cosmology and General Relativity + Seminar 240h or FQM: Advanced Quantum Mechanics 240h
4 (Summer Semester) 30 CP	Master Thesis 30 CP			

Table 3: Overview CSiS Curriculum: Elective Subjects (cont.)