

Curriculum Subsurface Engineering

Category	Specializ.	Module No.	Module name	Coordinator / Lecturers	CP	Sem.	
Compulsory: 33 CP	Both Specializations (GT + SCU)	SE-C-1	Mathematical Aspects of Differential Equations and Numerical Mathematics	Prof. B. Bramham (coordinator)	6	1	WiSe
		SE-C-2	Finite Element Methods in Linear Structural Mechanics	Prof. R. Sauer (coordinator)	6	1	WiSe
		SE-C-3	Geology of the Earth's Crust	Prof. C. Pascal Prof. W. Friederich	6	1	WiSe
			a) Special Methods in Structural Geology (block course) b) Structural Geology Field Camp (block course)		3 3		
		SE-C-4	Groundwater Hydraulics	Dr. T. Heinze (coordinator)	5	1	WiSe
		SE-C-5	Soil and Rock Behaviour	Prof. T. Wichtmann (coordinator) Prof. T. Backers	6	1	WiSe
a) Soil Behaviour and Simple Constitutive Models for Soils b) Stress Field and Rock Mass Behavior (block course)	3 3						
SE-C-6	Project Work	Professors, lecturers and assistants	4	3	WiSe		
Compulsory Optional: GT + SCU: 42 CP	Geotechnics and Tunneling (GT)	SE-CO-1	Foundation Engineering and Utility Pipe Construction: Design-Engin.-Techn. a) Design, engineering and technologies in Foundation Engineering b) Design, engineering and technologies in Utility Pipe Construction	Prof. M. Thewes (coordinator) Dr. B. Schöber	6 3 3	3	WiSe
		SE-CO-2	Conventional and Mechanised Tunneling: Design-Engineering-Technologies a) Design, engineering and technologies in Tunneling b) Design, engineering and technologies in Pipeline Construction	Prof. M. Thewes (coordinator) Dr. B. Schöber	6 3 3	2	SuSe
		SE-CO-3	Numerical Simulation in Geotechnics and Tunneling	Prof. T. Wichtmann (coordinator) Dr. C. Schmüderich	6	2	SuSe
		SE-CO-5	Operation and Maintenance of Tunnels and Utility Pipes	Prof. M. Thewes (coordinator) Prof. R. Leuker Prof. B. Bosseler	6	3	WiSe
			a) Facility management of underground transportation infrastructure b) Pipeline maintenance and network management		3 3		
		SE-CO-6	Design of Geotechnical Structures - Shallow and Deep Foundations	Prof. T. Wichtmann (coordinator) Dr. N. Irani	6	2	SuSe
		SE-CO-7	Soil Dynamics and Geotechnical Earthquake Engineering	Prof. T. Wichtmann (coordinator) Dr. M. Goudarzy Dr. F. Prada, Dr. N. Irani	6	3	WiSe
	a) Soil Dynamics b) Geotechnical Earthquake Engineering		3 3				
	SE-CO-14	Design of Geotechnical Structures - Excavation Pits, Retaining Structures and Soil Improvement	Prof. T. Wichtmann (coordinator) Dr. M. Tafili, Dr. N. Irani	6	3	WiSe	
	SE-CO-21	Optimization Aided Design - Reinforced Concrete	Prof. P. Mark (coordinator)	6	2	SuSe	
	Both Specializations (GT + SCU)	SE-CO-8	Numerical Methods and Stochastics	Prof. M. Kronbichler (coordinator)	6	2	SuSe
		SE-CO-10	Advanced Constitutive Models for Geomaterials	Prof. T. Wichtmann (coordinator) Dr. C. Schmüderich, Dr. M. Tafili	6	2	SuSe
		SE-CO-11	Ground Exploration Methods	Prof. W. Friederich (coordinator)	10	3	Wise
			a) Geophysical Inverse Problems b) Seismic and electromagnetic field methods		5 5		
		SE-CO-19	Mechanical Modeling of Materials	Prof. D. Balzani (coordinator)	6	3	Wise
		SE-CO-20	Inelastic Finite Element Method for Structures	Prof. R. Sauer (coordinator) Dr. V. Gudzolic	6	3	WiSe
		SE-CO-22	Geothermal Drilling Engineering and Subsurface Technologies	Prof. R. Bracke (coordinator)	5	3	WiSe
		SE-CO-23	Nonlinear Finite Element Method for Structures	Prof. R. Sauer (coordinator)	6	2	SuSe
		SE-CO-24	Rock Mass Mechanics and Rock Engineering	Prof. T. Backers (coordinator) Dr. M. Duda	6	2	SuSe
		Subsurface Characterization and Utilization (SCU)	SE-CO-12	Applied Geophysics a) Reservoir Geophysics b) Rock Physics	Prof. J. Renner (coordinator)	10 5 5	2
	SE-CO-13		Geothermal Energy Systems	Prof. R. Bracke (coordinator)	5	2	SuSe
	SE-CO-15		Hydrogeological Methods	Dr. T. Heinze (coordinator)	8	2	SuSe
			a) Tracers in Hydrogeology b) Hydrogeological Field Camp				
	SE-CO-16		Seismotectonics and Seismic Hazard	Prof. R. Harrington (coordinator) Dr. D. Essing	6	3	WiSe
SE-CO-17	Selected Topics in Reservoir Characterization		Prof. J. Renner (coordinator)	9	2,4	both SuSe	
	a) Deep geothermal energy b) Well logging rudimens c) Well logging II, analysis, interpretation	5 2 2					
SE-CO-18	Reservoir Engineering	Prof. E.H. Saenger (coordinator)	5	3	WiSe		
Optional: 15 CP	Both Specializations (GT + SCU)	SE-O-1	Practical Training on Tunneling and Pipeline Construction Techniques	Prof. M. Thewes (coordinator)	2	2	SuSe
		SE-O-2	Aspects of Design and Construction of Tunnels and other Subsurface Infrastructure in Practice	Prof. M. Thewes (coordinator)	2	3	WiSe
		SE-O-3	Technologies in Mechanised Tunneling	Prof. M. Thewes (coordinator) Dr. G. Wehrmeyer	2	2	SuSe
		SE-O-4	Practical Soil Mechanics	Prof. T. Wichtmann (coordinator) Dr. W. Baille	3	3	WiSe
		SE-O-5	Environmental Geotechnics	Prof. T. Wichtmann (coordinator) Dr. W. Baille, Dr. D. König	3	2	SuSe
		SE-O-6	Variational Calculus and Tensor Analysis	Prof. J. Waimann (coordinator) Dr. U. Hoppe	5	3	WiSe
		SE-O-7	Digital Rock Physics	Prof. E.H. Saenger (coordinator)	5	2	SuSe
		SE-O-8	High-Performance Computing on Multicore Processors	Prof. A. Vogel (coordinator)	6	2	SuSe
		SE-O-9	High-Performance Computing on Clusters	Prof. A. Vogel (coordinator)	6	3	WiSe
		SE-O-10	Scientific Programming	Prof. A. Vogel (coordinator)	6	3	WiSe
		SE-O-16	Introduction to advanced numerical methods for particulate media	Prof. T. Wichtmann (coordinator) Dr. M. Salimi	3	3	WiSe
		SE-O-17	Uncertainty Quantification in FE Analyses with Surrogate Modeling	Prof. R. Sauer (coordinator) Dr. B.T. Cao, Dr. G. Neu	6	3	WiSe
		SE-O-18	Problematic Soils	Prof. T. Wichtmann (coordinator) Dr. W. Baille	3	3	WiSe
		SE-O-14	Training of Competences (Part 1)		4	1,2,3,4	both
		SE-O-15	Training of Competences (Part 2)		4	1,2,3,4	both
Master Thesis: 30 CP		SE-MT	Master Thesis	Professors, lecturers and assistants	30	4	SuSe