

Curriculum Subsurface Engineering

Category	Specializ.	Module No.	Module name	Coordinator / Lecturers	CP	Sem.	
Compulsary: 33 CP	Both Specializations (GT + SCU)	SE-C-1	Mathematical Aspects of Differential Equations and Numerical Mathematics	Prof. M. Kronbichler (coordinator)	6	1	WiSe
		SE-C-2	Finite Element Methods in Linear Structural Mechanics	Prof. R. Sauer (coordinator)	6	1	WiSe
		SE-C-3	Fundamentals of Geoscience for Subsurface Engineers a) Physical Geology for non-geologists b) Acquisition, analysis, and interpretation of geophysical measurements	Prof. T. Backers (coordinator)	6	1	WiSe
				Prof. R. Harrington, Prof. J. Bedford	3		
		SE-C-4	Groundwater Hydraulics	Dr. T. Heinze (coordinator)	5	1	WiSe
		SE-C-5	Soil Behaviour and Simple Constitutive Models a) Soil Mechanics b) Soil Behaviour under Monotonic, Cyclic and Dynamic Loading c) Simple Constitutive Models for Soils	Dr. N. Irani	6	1	WiSe
Prof. T. Wichtmann (coordinator) Dr. N. Irani	3 1.5						
SE-C-6	Project Work	Professors, lecturers and assistants	4	3	WiSe		
Compulsary Optional: 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	WiSe
				3			
		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	2	SuSe
				3			
		SE-CO-3	Numerical Simulation in Geotechnics and Tunneling	Prof. T. Wichtmann (coord.), Dr. M. Salimi	6	2	SuSe
		SE-CO-4	Concrete Technology and Structural Durability	Prof. I. Curosu (coordinator)	6	3	WiSe
		SE-CO-5	Operation and Maintenance of Tunnels and Utility Pipes a) Facility management of underground transportation infrastructure b) Pipeline maintenance and network management	Prof. M. Thewes (coordinator) Prof. R. Leuker	6 3	3	WiSe
				Prof. B. Bosseler	3		
	SE-CO-6	Design of Geotechnical Structures - Shallow and Deep Foundations	Prof. T. Wichtmann (coord.), Dr. N. Irani	6	2	SuSe	
	SE-CO-7	Soil Dynamics and Geotechnical Earthquake Engineering a) Soil Dynamics b) Geotechnical Earthquake Engineering	Prof. T. Wichtmann (coordinator) Dr. M. Goudarzy	6 3	3	WiSe	
			Dr. F. Prada, Dr. N. Irani	3			
	SE-CO-14	Design of Geotechnical Structures - Excavation Pits, Retaining Structures and Soil Improvement	Prof. T. Wichtmann (coordinator)	6	3	WiSe	
	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 (coord.), Dr. M. Tafili	6	2	SuSe
		SE-CO-19	Mechanical Modeling of Materials	Prof. D. Balzani (coordinator)	6	1,3	WiSe
		SE-CO-20	Inelastic Finite Element Methods for Structures	Prof. R. Sauer (coord.), Dr. V. Gudzulic	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 Methods for Structures	Prof. R. Sauer (coordinator)	6	2	SuSe
		SE-CO-24	Rock Mass Mechanics and Rock Engineering	Prof. T. Backers (coord.), 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	2
	5 5						
	SE-CO-13		Geothermal Energy Systems	Prof. R. Bracke (coordinator)	5	2	SuSe
	SE-CO-15		Hydrogeological Methods a) Analysis of Measurement Results b) Hydrogeological Field Exercises	Dr. T. Heinze (coordinator)	6	2	SuSe
	SE-CO-16		Seismotectonics and Seismic Hazard	Prof. R. Harrington (coord.), Dr. D. Essing	6	3	WiSe
	SE-CO-17		Selected Topics in Reservoir Characterization a) Deep geothermal energy b) Well logging	Prof. J. Renner (coordinator) Prof. T. Reinsch	9 5	2	both SuSe
4				3			
SE-CO-18	Reservoir Engineering		Prof. E.H. Saenger (coordinator)	5	3	WiSe	
SE-CO-25	Rock Mass Stress Fields a) Stress Field and Rock Mass Behaviour b) Stress Field Modelling and Simulation		Prof. T. Backers (coordinator)	5	3	WiSe	
SE-CO-26	Ground Exploration Methods a) Optimization methods for geophysics b) Gravity and magnetics/Potential fields	Prof. J. Bedford (coordinator) Dr. K. Fischer	11 6	2	SoSe		
5							
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 (coord.), 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 (coord.), Dr. U. Hoppe	5	3	WiSe
		SE-O-7	Digital Rock Physics	Prof. E.H. Saenger (coordinator)	5	2	SuSe
		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 (coord.), 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 (coord.), Dr. W. Baille	3	3	WiSe
		SE-O-19	Computational Structural Optimization	Prof. R. Sauer (coord.), Prof. A. Saxena	6	3	WiSe
		SE-O-21	Selected Topics of Geotechnical and Geoenvironmental Engineering	Prof. T. Wichtmann (coord.), Dr. D. König	2	2,3	both
SE-O-22	Deep Learning for Engineers	Prof. A. Vogel (coordinator)	6	2	SuSe		
SE-O-23	German A1	J. Salzinger	5	1,3	WiSe		
SE-O-24	German A2	J. Salzinger	5	2	SoSe		
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

Courses from completed previous master programs cannot be acknowledged for the SSE program.