

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) Prof. R. Harrington, Prof. J. Bedford	6 3 3	1 WiSe
		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 Prof. T. Wichtmann (coordinator) Dr. N. Irani	6 3 1.5 1.5	1 WiSe
		SE-C-6	Project Work	Professors, lecturers and assistants	4	3 WiSe
Compulsary 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. Schößer	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. Schößer	6 3 3	2 SuSe
		SE-CO-3	Numerical Simulation in Geotechnics and Tunneling	Prof. T. Wichtmann (coordinator) Dr. C. Schmüdderich	6	2 SuSe
		SE-CO-4	Concrete Technology and Structural Durability	Prof. I. Curosu (coordinator) Dr. B.-Y. Youn-Çale	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 Prof. B. Bosseler	6 3 3	3 WiSe
		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 a) Soil Dynamics b) Geotechnical Earthquake Engineering	Prof. T. Wichtmann (coordinator) Dr. M. Goudarzy Dr. F. Prada, Dr. N. Irani	6 3 3	3 WiSe
		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. Schmüdderich, 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 (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 Methods for Structures	Prof. R. Sauer (coordinator)	6	2 SuSe
	Subsurface Characterization and Utilization (SCU)	SE-CO-24	Rock Mass Mechanics and Rock Engineering	Prof. T. Backers (coordinator) Dr. M. Duda	6	2 SuSe
		SE-CO-12	Applied Geophysics a) Reservoir Geophysics b) Rock Physics	Prof. J. Renner (coordinator)	10 5 5	2 SuSe
		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 (coordinator) 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. J. Renner Prof. T. Reinsch	9 5 4	2 both SuSe WiSe
		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
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-19	Computational Structural Optimization	Prof. R. Sauer (coordinator) Prof. A. Saxena	6	3 WiSe
		SE-O-21	Selected Topics of Geotechnical and Geoenvironmental Engineering	Prof. T. Wichtmann (coordinator)	2	2,3 both
		SE-O-20	German A1/A2	J. Salzinger	2	1,3 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

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