

Module Nr.	Credits	Workload	Semester	Frequency	Duration
SE-CO-6	6 CP	180 h	3	Yearly (WS)	1 Semester
Courses			Contact time	Self-study	Group size
a) Shallow and Deep Foundations			2 h/week	60 h	---
b) Excavation Pits, Retaining Structures and Soil Improvement			2 h/week	60 h	
Design of Geotechnical Structures					
Learning outcomes					
After successfully completing the modules, the students are able to					
<ul style="list-style-type: none"> estimate the stability and deformation of geotechnical structures based on the fundamental concepts of soil mechanics, in accordance with the standard and modified methods, supported by in-situ testing and laboratory experiments, apply different concepts of soil improvement using diverse empirical, analytical and numerical calculation and design procedures for improved/reinforced geostructures, recommend the appropriate geotechnical structure according to soil conditions, expected loads and design requirements, determine suitable methods for construction of the geotechnical structure 					
Content					
a) Shallow and Deep Foundations					
The course deals with the construction and design of shallow and deep foundations:					
<ul style="list-style-type: none"> Shallow foundations Mat foundations Pile foundations under vertical and horizontal loading Pile groups Drilled-shaft (caisson) foundations 					
b) Excavation Pits, Retaining Structures and Soil Improvement					
The course:					
<ul style="list-style-type: none"> Introduces possible failure mechanisms of retaining systems, soil slopes as well as excavation pits and soil dikes Gives a general overview to different type of retaining structures (e.g. flexible and rigid) with active and passive facings Discusses different calculation methods to determine the safety factor of the slopes, excavation pits and retaining structures against failure Explains multitude of supporting techniques (e.g. back anchoring, nailing, etc.) with their corresponding design methods with special attention to the interactions between the soil and supporting structure Covers the seismic design of excavation pits and retaining structures Introduces different methods of soil improvement Gives an intensive overview to geosynthetic soil reinforced geostructures Discusses the deep soil improvement techniques (deep mixing, stone column, Geosynthetic Encased Columns-GEC) 					

<ul style="list-style-type: none"> • Discusses the methods of design of geosynthetic reinforced soil systems based on German design guideline for reinforced soil structures (EBGEO) • Introduces retaining structures back anchored with geosynthetic reinforcement
Teaching methods / Language a) Lectures with accompanying exercises (2 h/week) / English b) Lectures with accompanying exercises (2 h/week) / English
Modes of assessment Final written exam (180 minutes)
Requirements for the award of credit points Passed final module examination: written examination
Module applicability (in other study programs) -
Weight of the mark for the final score 5 %
Module coordinator and lecturer(s) Prof. Dr.-Ing. habil. T. Wichtmann (coordinator) Dr.-Ing. F. Prada, Dr.-Ing. A. Lavasan
Other information Recommended previous knowledge: Completed module in Computational Methods-1 (Soil behaviour and simple constitutive models for soils).