Soil and Rock Behaviour

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Module number	Credits	Workload	Semester[s]	Duration	Group size
SE-C-5	6 CP	180 h	1. Sem.	1 Semester[s]	no limitation

Courses	Contact hours	Self-study	Frequency
a) Soil Behaviour and Simple Constitutive Models for Soils b) Stress Field and Rock Mass Behavior	a) 2 WLH (30 h) b) 4 WLH (60 h)	a) 60 h b) 30 h	a) each winter b) each winter

Module coordinator and lecturer(s)

Prof. Dr.-Ing. Torsten Wichtmann

a) Dr.-Ing. Christoph Schmüdderich, Prof. Dr.-Ing. Torsten Wichtmann

b) Prof. Dr. Tobias Backers

Admission requirements

Learning outcome, core skills

After successfully completing the module, the students

- can assess the constitutive behaviour of the soil under different hydromechanical loading conditions,
- are able to develop strategies to apply simple constitutive laws to model the fundamental soil behaviour in numerical simulations and understand the limitations of these models,
- are able to determine the parameters of simple constitutive models from laboratory test results,
- are familiar with rock and rock mass behaviour and the sources of stress in the earth's crust. They know how to estimate and measure rock mass stress.

Contents

a)

The course introduces the conventional and advanced laboratory testing methods and addresses expected soil behaviour under monotonic and cyclic loading conditions from numerical modeling perspectives. Fundamentals of standard elastoplasticity applied to geotechnical materials in accordance to failure criteria will be introduced. Additionally, it discusses the fundamentals, advantages and limitations of widely used simple constitutive models for soils such as:

- Linear Elastic (LE) model
- Mohr-Coulomb (MC) model
- Hardening Soil (HS) model

Finally, the calibration of simple constitutive models from laboratory tests will be discussed and these models will be applied to different geotechnical problems.

b)

Definition of stress, rock deformation, rock failure, rock mass definition, sources of stress in the earth crust, methods of stress measurement and stress modelling, determination of stress alterations and stress redistribution.

Educational form / Language

a) Lecture (2 WLH) / English

b) Block seminar / English

Examination methods • Seminar 'Stress Field and Rock Mass Behavior' (60 h., ungraded) • Written exam 'Soil and rock behaviour' (180 min., Part of modul grade 100 %)
Requirements for the award of credit points • Passing the examination
Module applicability • M.Sc. Subsurface Engineering
Weight of the mark for the final score Percentage of total grade [%] = 6 * 100 * FAK / DIV FAK: The weighting factors can be taken from the table of contents. DIV: The values can be taken from the table of contents.
Further Information