Conventional and Mechanised Tunneling: Design – Engineering – Technologies

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Module number	**Credits**	**Workload**	**Semester[s]**	**Duration**	**Group size**
BI-WP11/SE-CO-2	6 CP	180 h	2. Sem.	1 Semester[s]	no limitation
Courses			**Contact hours**	**Self-study**	**Frequency**
a) Design, engineering and techno-logies in Tunneling and Pipeline Construction			a) 4 WLH (60 h)	a) 120 h	a) each summer

Module coordinator and lecturer(s)

Prof. Dr.-Ing. Markus Thewes

a) Prof. Dr.-Ing. Markus Thewes, Dr.-Ing. Britta Schößer

Admission requirements

Recommended previous knowledge:

Bachelor-level knowledge of construction operations and construction process engineering, Bachelor-level knowledge of foundation engineering and soil mechanics

Learning outcome, core skills

The module is intended to familiarize students comprehensively with the whole field of tunneling. The participants will acquire in-depth knowledge for engineering tasks in the areas of planning, construction and operation of tunnels. The students will learn to independently work on tasks from these areas and to develop a specific understanding of the methods. They will be enabled to solve the common problems of tunnel design and construction and to work independently and purposefully. Relations of this area with other areas of civil engineering as an interdisciplinary task are recognized and integrated into the solutions. The students will acquire knowledge that is necessary for the preparation and execution of construction projects of tunnel construction. The methods commonly used in practice shall be applied.

Contents

a)

The lecture deals with the extended basic knowledge of Tunnel Engineering.

a) Design, engineering and technologies in Tunneling

- Planning methods for tunnel constructions
- Methods and components of for temporary and final tunnel lining
- Conventional Tunneling
- Excavation techniques for soil and rock
- Conventional tunneling with mechanized excavation of the rock mass
- Sprayed concrete method
- Compressed air method
- Mechanized tunneling, different Tunnel Boring Machines adapted to the boundary conditions on rock and soil formations
- Single-shell and double-shell tunnel linings
- Special construction methods
- Monitoring and process management
- Special features of tunneling logistics and ventilation
- Safety aspects during construction and operation

- Settlement prediction for green-field and buildings

b) Design, engineering and technologies for Trenchless Construction Techniques (manned)

- Technical principals of manned techniques – steerable
- Microtunnelling,
- Pipe Jacking
- Construction and structural analysis of Jacking Pipes
- Jacking Forces, Jacking Force Prediction

Educational form / Language

a) Tutorial (1 WLH) / Lecture (3 WLH) / English

Examination methods

• Written exam 'Design, engineering and technologies in Tunneling and Pipeline Construction' (120 min., Part of modul grade 100 %, optionally English or German)

• Term paper 'Design, engineering and technologies in Tunneling and Pipeline Construction - Homework' (30 h., Part of modul grade 0 %, optionally English or German)

Requirements for the award of credit points

- Presentation of the results of the homework assignment
- Passed written examination of the module

Module applicability

- M.Sc. Civil Engineering
- M.Sc. Subsurface Engineering
- M.Sc. Geosciences

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