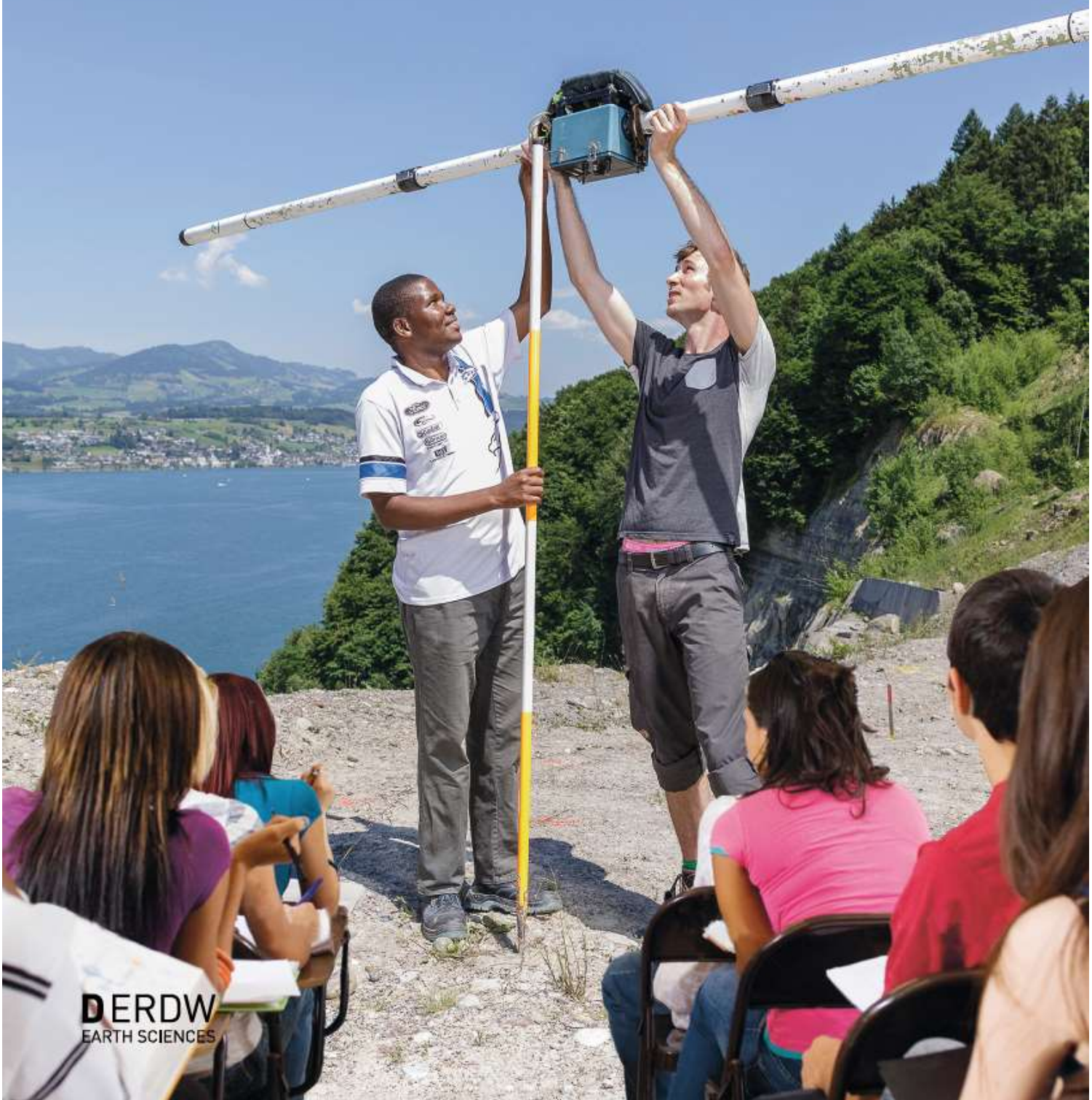
ETH zürich

Master in Earth Sciences

Study Guide 2017



D ERDW
EARTH SCIENCES

Master’s programme in Earth Sciences

Study Guide 2017/2018

4.4 Major in Engineering Geology

The Major in Engineering Geology focuses on the interactions between man, engineered structures and geology. Students learn to characterise and predict the behaviour of rocks and soils under near-surface loading conditions such as in surface excavations, tunnels, dams, and below roads, buildings and bridges. In addition, students learn how to identify, characterise and cope with natural slope instabilities (landslides, rock falls, mud flows, etc.) and become familiar with fundamental and applied issues of groundwater use and geological waste disposal. More specifically, students attain the ability to characterise the site geology in the form of a comprehensive geotechnical or hydrogeological model. Students learn how to design and execute a targeted site investigation programme, how to assemble, interpret and synthesise diverse and often highly-fragmented geological and technical data, and how to transfer such data into an appropriate and scientifically-valid model as required for engineering analysis and design.

4.4.1 Compulsory Engineering Geology modules

The four compulsory modules of the Major in Engineering Geology cover the core skills of engineering geology and provide the foundation knowledge for study of the geo-environment, hazards, hydrogeology, soil and rock mechanics, foundation engineering and underground construction. Engineering geological and hydrogeological properties and processes in rocks and soils are introduced and applied to ongoing projects in Switzerland and abroad.

All course registration must be done by myStudies[a]. For administrative reasons an additional registration for excursions is needed on the departmental website[b].

Fundamentals			
Compulsory courses (12 KP)			
651-4023-00	Groundwater	HS	4 KP
651-4025-00	Rock Mechanics and Rock Engineering	HS	4 KP
651-4033-00	Soil Mechanics and Foundation Engineering	HS	4 KP

Methods			
Compulsory courses (12 KP)			
651-4065-00	Geological Site Investigations	HS	3 KP
651-4064-00	Engineering Geological Field Course I (Soils)	FS	3 KP
651-4066-00	Engineering Geological Field Course II (Rocks)	FS	3 KP
651-4061-00	Hydrogeological Field Course	FS	3 KP

[a] www.mystudies.ethz.ch
[b] www.conference.ethz.ch/erdw

Integration			
Compulsory courses (13 KP)			
651-4072-00	Engineering Geology of Underground Excavations	FS	5 KP
651-4074-00	Landfills and Deep Geological Disposal of Radioactive Waste	FS	3 KP
651-4070-00	Landslide Analysis	FS	5 KP

Industrial Internship			
Compulsory course (12 KP)			
651-4071-00	Industrial Internship	HS/FS	12 KP

The fourth compulsory module for all students of the Major in Engineering Geology is an industrial internship (third semester). The internship consists of 10 weeks practical work in a consultant office, public authority or engineering contractor. The internship concludes with a written report.

4.4.2 Recommended courses in Engineering Geology

All course registration must be done by myStudies[a]. For administrative reasons an additional registration for excursions is needed the departmental website[b].

Engineering Geological Seminar			
Compulsory course (2 KP)			
651-4068-00	Engineering Geological Seminar	FS	2 KP

The Engineering Geology Seminar (fourth semester) is compulsory for students majoring in Engineering Geology. The seminar consists of lectures given by all the students and by external guest scientists. The lectures given by the students refer to preliminary results of their Master's Project.

In this seminar students learn to work with scientific literature and to approach problems from a scientific point of view. In addition students learn to plan a longer project and to present and discuss scientific results. The attendance is thus a part of the Master's Project Proposal and the thesis itself. Furthermore the seminar gives an in-depth knowledge into a few selected research topics in Engineering Geology.

Detailed information on the seminar is online[c].

[a] www.mystudies.ethz.ch
[b] www.conference.ethz.ch/erdw
[c] www.erdw.ethz.ch/en/studies/master/earth-sciences/engineering-geology

It is recommended that students majoring in Engineering Geology use their elective credits to take many of the recommended courses listed below. The final selection can be made through the study plan and approved by the Master's Committee.

Recommended Course List in Engineering Geology			
Recommended courses			
651-4097-00	Applied Mineralogy and Non-Metallic Resources I	HS	3 KP
651-4007-00	Continuum Mechanics	HS	3 KP
101-0307-00	Design and Construction in Geotechnical Engineering	HS	4 KP
651-4021-00	Engineering Seismology	HS	3 KP
651-4031-00	Geographic Information Systems	HS	3 KP
651-4109-00	Geothermal Energy	HS	3 KP
651-4003-00	Numerical Modelling of Rock Deformation	HS	3 KP
651-4901-00	Quaternary Dating Methods	HS	3 KP
651-4041-00	Sedimentology I: Physical Processes and Sedimentary Systems	HS	3 KP
101-0317-00	Tunnelling I	HS	3 KP
651-4276-00	Alpine Engineering Geological Excursions	FS	1 KP
651-4026-00	Applied Mineralogy and Non-Metallic Resources II	FS	3 KP
651-4018-00	Borehole Geophysics	FS	3 KP
651-4132-00	Field Course IV: Non Alpine Field Course	FS	3 KP
651-4080-00	Fluvial Sedimentology	FS	2 KP
651-4902-00	Quaternary Geology and Geomorphology of the Alps	FS	3 KP
651-4022-00	Structural Geology with Field Course	FS	4 KP
101-0302-00	Clays in Geotechnics: Problems and Applications	FS	3 KP
101-0318-01	Tunnelling II	FS	3 KP
651-4240-00	Geofluids	FS	6 KP
	4 CAS Short Courses in Applied Earth Sciences[a]	HS/FS	12 KP

[a] 3 credits each, for information refer to www.cas-erdw.ethz.ch