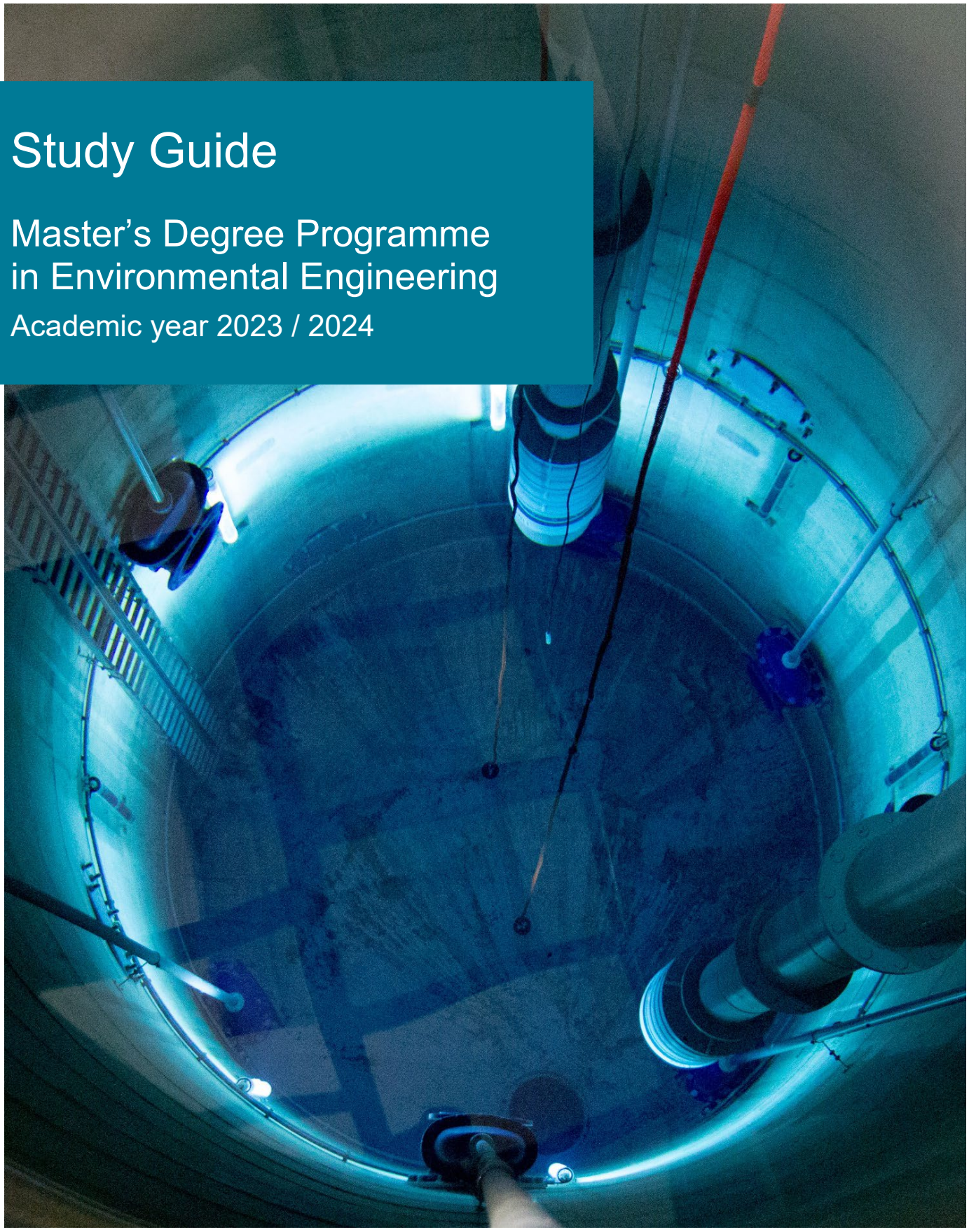
ETH zürich

Study Programme
Environmental Engineering

Study Guide

Master's Degree Programme in Environmental Engineering

Academic year 2023 / 2024



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Study Guide to the Master Program in Environmental Engineering at ETH Zurich

This study guide has no legal status.
In this guide, the titles for individuals and positions apply equally to men, women and diverse persons.

(Version: Oktober 2023)

1 Introduction

1.1 Overall Concept

Vital resources such as water, soil and air are becoming more and more scarce. This development is further reinforced by the ongoing global trend towards living in urban areas. Immediate action must be taken to avoid dividing the world up into densely populated towns, and desolate, abandoned rural areas.

The goal of Environmental Engineering is to use vital resources such as water, soil, building materials, etc. in a sustainable manner while maintaining important, natural environmental systems. The degree program in Environmental Engineering lays a broad foundation in Natural Sciences, Engineering and Social Sciences essential for designing and managing these systems. The program encourages interdisciplinary interactions with special attention being paid to networked, system-oriented and holistic thinking. All in all, Environmental Engineering not only encourages graduates to work on complex environmental, supply and wastage problems, but also to put forward economically viable and socially acceptable solutions.

1.2 Studying Environmental Engineering at ETH Zurich

Environmental Engineering has developed out of the discipline of Civil Engineering.
It was originally concerned mainly with sanitation, providing clean drinking water and disposing of wastewater. Now it also covers a whole host of problems and issues at the interface between technical systems and the environment. These include, for example, preserving resources (water, soil, air) and protecting or cleaning up the human environment (avoiding pollution, noise, light and vibrations, natural hazards). Environmental engineers devise concepts and methods for maintaining a balance between the requirements of man and natural ecosystems, and they develop the latest technologies for reducing man's impact on the environment.

The program in Environmental Engineering provides not only a sound technical training in engineering but also an introduction to natural sciences (Chemistry, Physics, Microbiology, Biochemistry, Ecology). The main focus is on multidisciplinary cooperation, with the course also providing an introduction to social sciences and economics. It is therefore excellent preparation for work in a number of different areas. The course aims not only to meet the requirements of engineering companies, public authorities and development organizations but also to equip students to work on planning, implementing and running projects or monitoring industrial plants and complete infrastructure systems.

1.3 Basic principles

The Master program in Environmental Engineering is based on the following legal principles:

- ETH Zurich Admissions Ordinance
- ETH Zurich Ordinance on Performance Assessments
- ETH Zurich Ordinance on Performance Assessments: Implementation stipulations determined by the Rector
- 2016 Program Regulations for the Master program in Environmental Engineering

and Directives of the rectorate
www.ethz.ch/en/studies/legal-principles-degrees/legal-basis/directives.html

The documents and further information about the Environmental Engineering program can downloaded from the program website at www.umwelting.ethz.ch.

The English translation of each document is for information purposes only.
The German version is the legally binding version, because English is not an official language of the Swiss Confederation.

1.4 Admission to the Environmental Engineering program

Students are accepted for the Environmental Engineering master program in accordance with the conditions of the ETH Zurich Admissions Regulations.

Information about admissions can be obtained from the Admissions Office of the Rectorate (see also the section on 7.3 Who - What - Where).

ETH Zurich
Admissions Office
HG F 21
Rämistrasse 101
8092 Zurich

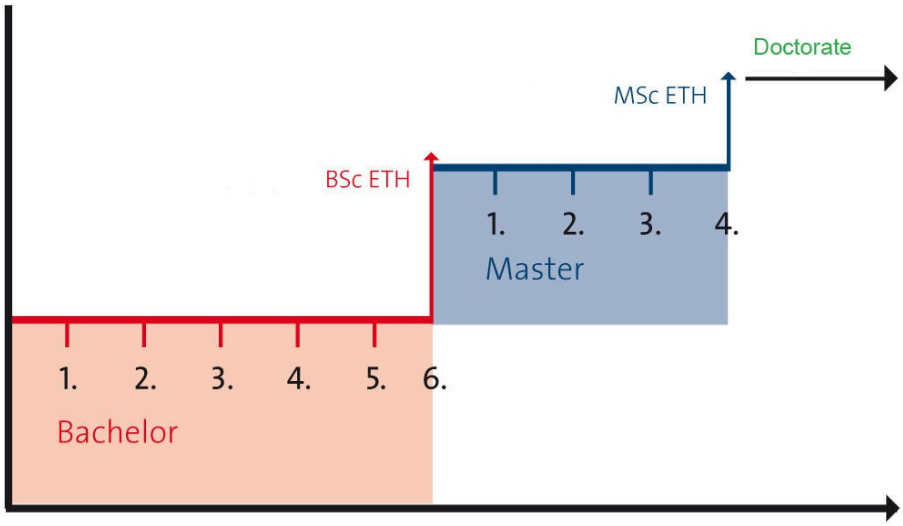
or from the website
www.ethz.ch/en/studies/registration-application/master/application.html

Language of instruction for the MSc program is English.

2 General information

2.1 Curriculum structure

The programs in Environmental Engineering at ETH Zurich follow the internationally agreed two-stage standard model of Bachelor and Master programs. Programs of study completed at ETH are assessed according to a credit point system. The credit point system at ETH Zurich is aligned with the European Credit Transfer System (ECTS).



The program in Environmental Engineering at ETH Zurich is based on a standard period of study of ten semesters, i.e. five years.
It is divided into the following two stages: the six-semester Bachelor program and the four-semester Master program.

In order to complete the program successfully, 180 credit points must be acquired during the Bachelor program and a further 120 points during the Master program. One credit point corresponds to 25-30 hours work for the student.

The final qualification achieved is the ***"ETH Master of Science in Environmental Engineering"***.

The program in Environmental Engineering is run by the Institute of Environmental Engineering at the Department of Civil, Environmental and Geomatic Engineering (D-BAUG) at ETH Zurich.

2.2 Performance assessments / examinations

For the Master Program in Environmental Engineering, the following forms of written or oral performance assessments are mainly carried out:

- graded or ungraded semester performances
- end-of-semester exams
- session exams

Semester performances
Semester performances mostly take the form of integrated performance assessments during the semester or performance assessments which take place outside of the normal semester schedule (e.g. block courses). A semester performance may be graded or ungraded. No separate registration is required for this type of performance assessment. However, students must enroll in the respective course.

End-of-semester examinations
This type of performance assessment is carried out during the last two weeks of a semester or during the first two weeks of the semester vacation.

Autumn Semester: Calendar weeks 50-51 and 2-3
Spring Semester: Calendar weeks 21-24

Registration during the prescribed period is also necessary for these performance assessments. The examination dates are announced by the lecturer.
These examinations are thus not shown in the examination schedule in myStudies.

If it is possible to repeat a performance assessment without having to re-enroll in a course, a repetition date, generally at the start of the following semester, is offered. These dates are also announced by the lecturers.
Students must register for such a repetition date using myStudies; this is only possible once the result of the first try has been officially published by the Study Administration Office.

Session examinations
This type of performance assessment is carried out during the examination sessions which are held twice a year.

Winter session: Calendar weeks 4-7
Summer session: Calendar weeks 32-35

Students must register for session examinations during the registration period. These examinations are planned by the Examinations Office and are listed in the student's personal examination schedule which is shown in myStudies.

Not all session examinations can be chosen each session. There are performance assessments which are only offered in the session immediately after the course. These examinations are specially marked in the Course Catalogue (www.vvz.ethz.ch): "The performance assessment is only offered in the session after the course unit. Repetition only possible after re-enrolling."

Repetition of performance assessments
If a course unit is taught again between a student's first attempt at the examination and his/her second try, it is possible that the modalities of examination and its content will have changed. It is the student's responsibility to find out early enough about any such changes (e.g. via the Course Catalogue or by asking the instructor).

Please note
All study achievements completed at ETH Zurich are listed, including any "no shows". The results achieved last are listed for study achievements verified with a description (in the case of a repeated course unit, for example).

Examination schedule
The provisional schedule for written examinations is displayed in myStudies approximately four weeks (Spring Semester) resp. six weeks (Autumn Semester) before the end of the semester.

Personal examination schedule
As a general rule, it is displayed in myStudies approximately five to six weeks before the start of the Summer examination session resp. three to four weeks before the start of the Winter examination session.

Shortly before the start of the exam session, the personal exam plan will be announced with the dates of the exams, room and definitive times.

All of your decreed achievements, together with the number of credits obtained, are listed in myStudies, under "Transcript of records".
For all other grades and results, you will receive an e-mail from your Study Administration Office. This lists all courses for which the grades/results have now been decreed.
The actual grades/results can be viewed in the transcript of records in myStudies.

2.3 ETH Zurich's Grading System and ECTS Grades

The credit system of ETH Zurich is based on the European Credit Transfer Systems (ECTS). Credits are assigned to each learning unit according to the expected student workload. One Credit Point requires an average workload of 30 hours' of student work.

ETH Zurich does not use the ECTS Grading Scheme. The grading scale goes from 1.0 to 6.0 in quarter grade (0.25) steps. The pass grade is 4.0, the maximum grade is 6.0. The numerical grades correspond to the following predicates:

ETH Zurich Grades	
6.0 – 5.75	excellent (ausgezeichnet)
5.5 – 5.25	very good (sehr gut)
5.0 – 4.75	good (gut)
4.5 – 4.25	satisfactory (befriedigend)
4.0	pass (genügend)
3.5	fail (ungenügend)
3.0	poor (schlecht)
2.5	very poor (schlecht bis sehr schlecht)
2.0	extremely poor (sehr schlecht)
1.0	not measurable (nicht messbar)

The above grades are not rigidly related to any distribution function and are not awarded according to predetermined percentages or numerical scores. A student's grade in a subject is more related to the student's mastery of the material than to the relative performance of his or her peers.

3 The Environmental Engineering program

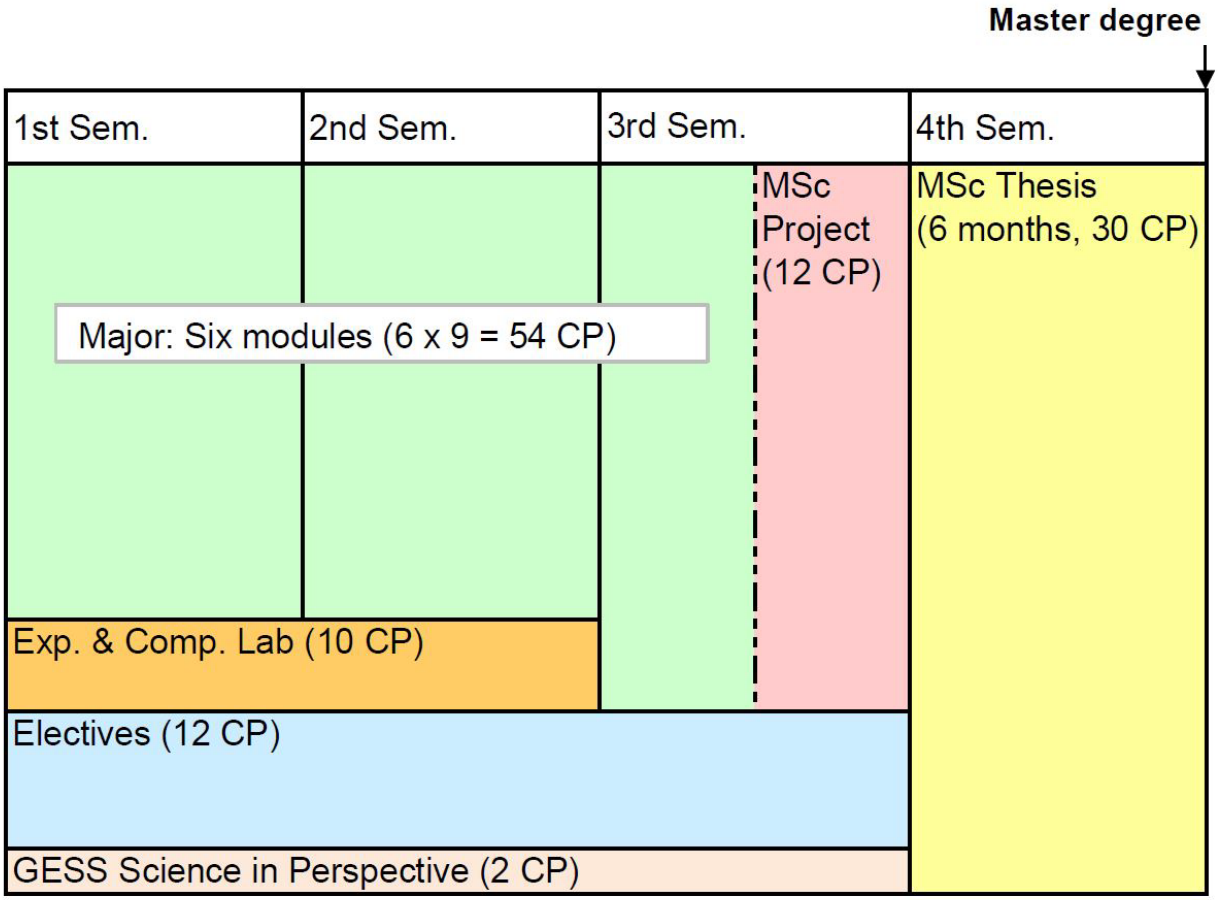
3.1 Objectives and content

The Master program equips students with the practical and scientific skills to work independently as environmental engineers. It generally lasts for four semesters.
Students who have already completed the Bachelor program in Environmental Engineering or Environmental Sciences at ETH Zurich will be admitted directly to the Master program.
Graduates from a different Bachelor program can also be admitted if they meet the requirements stated in the program regulations for the Master program.

During the Master program, students have the opportunity to study one specialist areas from the field of Environmental Engineering in greater depth. To a great extent, they can tailor the course to suit their personal interests and inclinations.

3.2 Curriculum

The Environmental Engineering curriculum enables students to analyze complex environmental problems and develop technical solutions. Environmental Engineering acts as the intermediary between the inevitable use of key resources, such as water, soil, air etc. on the one hand, and the preservation of valuable natural systems on the other. The curriculum introduces future environmental engineers to the basics of natural, industrial and social science, essential to understanding, designing and managing these systems.



Areas of specialization: Choose one of five majors

Before commencing the Master program, students must decide on one of the following major subjects:

- Urban Water Management
- Environmental Technologies
- Resource Management
- Water Resources Management
- River and Hydraulic Engineering (partly in German)

Students may change their choice of major subject during the Master program, subject to the above restrictions. Credit points that have already been acquired in the major that was chosen originally can be counted in the optional categories.

A major subject that is failed can be retaken once. If a performance assessment in a major subject is failed twice, that subject can no longer be completed. If a major subject is failed twice, students must change their choice of subject area.

3.2.1 The five majors

Urban Water Management

This major is focused on managing water and wastewater in cities. As a basis for water and wastewater treatment and resource recovery courses are focused on fundamentals, design, and operation of biological, chemical, and physical unit processes. Infrastructure planning, management, and control provide the methodologies for the overall optimization of the urban water cycle.

Environmental Technologies

This major provides the students with in-depth knowledge on the air quality control, urban water management, wastewater and drinking water treatment, and solid waste treatment and recycling. At the end of the study, the students can identify the pollutants and their sources. The students can apply the technologies to design systems for clean air, water and cities.

Resource Management

The focus of this major is on the sustainable management of resources, preventing scarcities and minimizing environmental impact. It includes modeling and assessment of environmental systems and material cycles. Students will be able to solve complex problems and answer strategic questions about sustainable resource management from a system-oriented perspective.

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Water Resources Management

This major is focused on understanding, modeling and monitoring of hydrological processes at a range of spatial scales from microscale to catchment scale and on the management of water resources. Student learn about the theory and applications of subsurface and surface flow to rivers and aquifers, the rainfall-runoff transformation, water and sediment fluxes in the fluvial system including ecological effects, and water resources management and optimization methods.

River and Hydraulic Engineering

The profile provides an integral knowledge about hydraulic engineering in an environmental context. Based on a hydrology and water resources background, the fluvial modelling at different scales from fluid flow to river reaches, as well as river engineering methods within the environment are focused. The hydraulic systems and their structural and operational aspects needed for a sustainable and environmentally sound management of water resources are treated. The candidates will learn about flood protection measures and will acquire knowledge on river restoration, fluvial structures planning, and design and operation of hydropower plants, dams and other hydraulic infrastructure.

3.2.2 **Compulsory modules for the different majors**

Five Majors ⟶ ● = compulsory **Modules** ↓	Urban Water Management	Environmental Technologies	Resource Management	Water Resources Management	River and Hydraulic Engineering
Water Infrastr. Plan. & Stormw. Managt.	●				
Syst. Analysis in Urban Water Managt.	●	●			
Proc. Engr. in Urban Water Managt.	●	●			
Air Quality Control		●			
Waste Management		●	●		
Ecological Systems Design	●		●		
Groundwater			●	●	
Water Resources Management			●	●	●
Flow and Transport				●	●
Landscape				●	
River Systems					●
Hydraulic Engineering (in German)					●
Remote Sensing and Earth Observation					
Soil					

3.2.3 **Overview of modules**

↓ Modules Major → ● = compulsory * replacements -> see course catalogue; The information provided in the Course Catalogue at www.vvz.ethz.ch is binding.	CP	Sem.	Urban Water Man.	Environm. Techn.	Resource Managt.	Water Res. Man.	River & Hydr. Eng.
Water Infrastr. Planning & Stormw. Managt. [WatInfra]							
Infrastructure Systems in Urban Water Management	3	2	●				
Urban Drainage Planning and Modelling	6	3					
Systems analysis in Urban Water Managt. [SysUWM]							
Systems Analysis and Mathematical Modelling in UWM	6	1	●	●			
Process Engineering Ia*	3	1					
Process Eng. in Urban Water Managt. [ProcUWM]							
Process Engineering Ib	3	2	●	●			
Process Engineering II	6	2					
Air Quality Control [AIR]							
Air Pollution Modeling and Chemistry	3	1		●			
Air Quality and Aerosol Mechanics	3	2					
Air Quality and Health Impact	3	2					
Waste Management [WASTE]							
Waste Recycling Technologies	3	1		●	●		
Process Engineering Ia*	3	1					
Waste Management and Circular Economy	3	2					
Ecological Systems Design [ESD]							
Advanced Environmental, Social and Economic Assessments	5	1	●		●		
Advanced Environmental Assessment (Computer Lab I)	1	1					
Prospective Environmental Assessments	3	2					
Groundwater [GROUND]							
Modelling Environmental Pollutants	3	2			●	●	
Groundwater II	6	2					
Water Resources Management [WRM]							
Watershed Modelling	6	1			●	●	●
Water Resources Management	3	2					
Flow and Transport [FLOW]							
Numerical Hydraulics	3	1				●	●
River Morphodynamic Modelling	3	2					
Ecohydraulics and Habitat Modelling	3	3					
Landscape [LAND]							
Landscape Planning and Environmental Systems	3	1				●	
Methodologies for Image Processing of Remote Sensing Data*	3	2					
River Basin Erosion*	3	3					
River Systems [RIVER]							
River Engineering	3	1					●
River Restoration	3	2					
River Basin Erosion*	3	3					
Hydraulic Engineering [HydEngr] (in German)							
Wasserbau II (in German)	6	1					●
Hochwasserschutz (in German)	3	2					
Remote sensing and earth observation [RemSens]							
Basics and Princ. of Radar Remote Sensing for Env. Appl.	3	1					
Methodologies for Image Processing of Remote Sensing Data*	3	2					
Applied Radar Remote Sensing	3	3					
Soil [SOIL]							
Environmental Soil Physics/Vadose Zone Hydrology	3	1					
Soil Mechanics (for Environmental Engineers)	3	2					
Soil-Plant Water Relations	3	3					

3.2.4 **Description of modules**

Modules	**Description**	**Prerequisites and recommendations for the modules**	**Required courses**
Water Infrastr. Planning & Storm-water Managt. [WatInfra]	How do we make sure that in the future we have good wastewater and drinking water services? Deficits of existing sewer and water supply networks need to be identified and reasonable measures suggested. A focus is put on adapting urban drainage systems to climate change and to improve water quality of rivers and lakes. Specifically, this module teaches the basics of infrastructure management and the various tools to quantitatively identify the hydraulic and hydrologic performance of urban drainage systems.	General understanding of urban water management.	• Infrastructure Syst. in Urb. Wat. Managt. (3 CP, 2. Sem.) • Urban Drainage Planning and Modelling (6 CP, 3. Sem.)
Systems Analysis in Urban Water Management [SysUWM]	This module provides the fundamental concepts needed for the design and critical evaluation of treatment processes applied for water or wastewater treatment. Systems Analysis provides the tools for a structured approach to develop and apply mathematical modeling. Process Engineering Ia is focused on biological processes.	General understanding of urban water management.	• Systems Analysis and Mathematical Modelling in UWM (6 CP, 1. Sem.) • Process Engineering Ia (3 CP, 1. Sem.)
Process Eng. in Urban Water Management [ProcUWM]	This module builds on the fundamental concepts introduced in the module [SysUWM]. In Process Engineering II students are introduced to physical-chemical processes for water and wastewater treatment. In Process Engineering Ib the application of biological processes is further advanced.	The module [SysUWM] is a required prerequisite	• Process Engineering Ib (3 CP, 2. Sem.) • Process Engineering II (6 CP, 2. Sem.)
Air Quality Control [AIR]	The students understand air pollution sources and impacts and can apply the learned technologies for air quality control.	BSc course on Air quality control (Luftreinhaltung) is strongly recommended.	• Air Pollution Modeling and Chemistry (3 CP, 1. Sem.) • Air Quality and Aerosol Mechanics (3 CP, 2. Sem.) • Air Quality and Health Impact (3 CP, 2. Sem.)

Modules	Description	Prerequisites and recommendations for the modules	Required courses
Waste Management [WASTE]	The students understand thermal and biological waste treatments and recycling technologies for solid waste and waste water and can evaluate the designs of such systems.	General understanding of waste management (e.g. from Bachelor course in Abfalltechnik).	• Waste Recycling Technologies (3 CP, 1. Sem.) • Process Engineering Ia (3 CP, 1. Sem.) • Waste management and Circular Economy (3 CP, 2. Sem.) → *Note: Students taking both of the modules SysUWM and WASTE must take the course 101-0339-00L Environmental Geotechnics – Polluted Sites and Waste Disposal in module WASTE as replacement for Process Engineering Ia that is listed in both modules.*
Ecological Systems Design [ESD]	Students are able to appropriately apply the major environmental assessment methods and can suggest improvement measures for sustainable resource management and the environmental performance of technologies.	Basic knowledge about the most common environmental assessment tools (e.g. from Bachelor course in Ecological Systems Analysis)	• Advanced Environmental., Social and Economics Assessments (5 CP, 1. Sem.) • Prospective Environmental Assessments (3 CP, 2. Sem.) • Advanced Environmental Assessment (Computer Lab I) (1 CP, 1. Sem.)
Groundwater [GROUND]	Module provides the fundamental knowledge to understand and apply methods and tools for modeling the flow and transport in groundwater and environmental pollutants. Courses teach how to formulate and solve practical flow and contaminant transport problems, solve simple inverse flow problems for parameter estimation given measurements, address multiphase flow and simple coupled reactive transport problems with appropriate tools.	BSc course Groundwater I	• Modelling Environmental Pollutants (3 CP, 2. Sem.) • Groundwater II (6 CP, 2. Sem.)
Water Resources Management [WRM]	Module provides the theoretical and practical knowledge of hydrological processes at the catchment scale. Courses teach methods of rainfall transformation to runoff and its modeling by conceptual and physically-based approaches including model calibration and uncertainty analysis. The use of GIS in hydrology is illustrated on practical examples. Principles of sustainable water resources management include optimal water allocation and environmental impacts.	BSc course Hydrology I	• Watershed Modelling (6 CP, 1. Sem.) • Water Resources Management (3 CP, 2. Sem.)

Modules	Description	Prerequisites and recommendations for the modules	Required courses
Flow and Transport [FLOW]	Module focuses on advanced topics in hydrodynamics, in particular steady and unsteady flow in open channels; on the effect of flow on river morphodynamics; and on the coupling between flow and biota in rivers and other aquatic ecosystems. Advanced topics including wave propagation and turbulence are also discussed. Emphasis is placed on numerical modeling, with numerical methods presented in the context of example applications.	BSc course Hydraulics	• Numerical Hydraulics (3 CP, 1. Sem.) • River Morphodynamic Modelling (3 CP, 2. Sem.) • Ecohydraulics and Habitat Modelling (3 CP, 3. Sem.)
Landscape [LAND]	Module provides a landscape perspective on environmental systems. Focus is on processes forming and changing landscapes and the description of landscape characteristics, sediment reduction and transfer and the development of sediment budgets in fluvial systems, methods of landscape monitoring by remote sensing of the hydrosphere, biosphere, cryosphere, and the quantification of ecosystem services. ⚠ *<u>ONLY in Autumn 2023</u>: The previous replacement course «Wildbach- und Hangverbau» for «River Basin Erosion» will not be offered. Students taking LAND and RIVER must take one from the following list as a substitute for River Basin Erosion, which occurs in both modules:* *-101-0577-00 An Introduction to Sustainable Development in the Built Environment (Autumn semester)* *-701-1257-00 European Climate Change (Autumn semester)* *-101-1249-00 Hydraulics of Engineering Structures (Autumn semester)*	BSc course Hydrology I or equivalent Basic knowledge of remote sensing	• Landscape Planning and Environmental Systems (3 CP, 1. Sem.) • Meth. for Image Processing of Remote Sensing Data (3 CP, 2. Sem.) • River Basin Erosion (3 CP, 3. Sem.) → *Note: Students taking both of the modules LAND and RIVER must take the course 101-1250-00 Wildbach- und Hangverbau* ⚠ *in module LAND as replacement for River Basin Erosion that is listed in both modules.* → *Note: Students taking both of the modules LAND and RemSens must take one of the courses 701-1232-00L Radiation and Climate Change (Spring semester) OR 701-1241-00L Atmospheric Remote Sensing (Autumn semester) OR 701-1644-00L Mountain Forest Hydrology (Autumn semester) in module LAND as replacement of Methodologies for Image Processing of Remote Sensing Data that is listed in both modules.*

Modules	Description	Prerequisites and recommendations for the modules	Required courses
River Systems [RIVER]	Module provides the theoretical and practical knowledge required to describe, analyze and manage river systems. The environmental engineer is taught basics of sediment transport in rivers including measurement and estimation methods, the resulting river morphology and its change, the sources and type of sediment supplied from the watershed. Finally these concepts are brought together in practical applications to the revitalization of regulated rivers.		• River Engineering (3 CP, 1. Sem.) • River Restoration (3 CP, 2. Sem.) • River Basin Erosion (3 CP, 3. Sem.)
Hydraulic Engr. [HydEng] (in German)	The module provides the theoretical and practical knowledge on hydraulic structures and their functions within hydraulic schemes. The basic layout and design concepts are explained with regard to economic efficiency and structural safety. In addition, the processes leading to flood damages are illustrated and different flood protection concepts and structural countermeasures to mitigate damages are discussed. Practical planning methods to implement flood protection measures in practice are presented.	The BSc-Course “Wasserbau” (LV 101-0206) is strongly recommended.	• Wasserbau II (in German) (6 CP, 1. Sem.) • Hochwasserschutz (in German) (3 CP, 2. Sem.)
Remote Sensing and Earth Observation [RemSens]	This module provides insight into remote sensing technologies, systems, methodologies and information products. Remote sensing is a new and innovative tool for Environmental Engineers and is becoming more and more valuable for their daily handling.	General understanding of Remote Sensing	• Basics and Princ. of Radar Remote Sensing for Env. Appl. (3 CP, 1. Sem.) • Meth. for Image Processing of Remote Sensing Data (3 CP, 2. Sem.) • Applied Radar Remote Sensing (3 CP, 3. Sem.)
Soil [SOIL]	Students will acquire knowledge and quantitative skills related to characterization and representation of processes and functions of soils and their role in the hydrologic cycle, ecosystem services, climate, and geotechnical applications. A focus will be given to measurement and modeling of mass and energy fluxes, transport and pollution, biophysical processes (plants and biogeochemical cycles), and to soil as a natural resource.	None	• Environmental Soil Physics/Vadose Zone Hydrology (3 CP, 1. Sem.) • Soil Mechanics (3 CP, 2. Sem.) • Soil-Plant Water Relations (3 CP, 3. Sem.)

3.2.5 **Recommended optional modules**

Major	**Recommended optional modules**
Urban Water Management	Flow of water and transport of contaminants in the natural environment: [GROUND] + [FLOW]. Broader aspects of processes for environmental protection: [AIR] + [WASTE] Urban planning and remote sensing: [LAND] + [RemSens]
Environmental Technologies	Decision making and environmental impact: [ESD] Resource monitoring: [RemSens] Linking waste management with soil protection: [SOIL] Overall environmental technology planning: [WatInfra]
Resource Management	Soil and land resources: [SOIL] + [LAND] Clean air as a resource: [AIR] Crosscutting for resource monitoring: [RemSens]
Water Resources Management	For urban hydrology: [WatInfra] + [SysUWM] For river engineering: [RIVER] + [HydEng] For soil processes: [SOIL] For global hydrology: [RemSens] For environmental impacts: [ESD]
River and Hydraulic Engineering (partly in German)	For urban water engineering: [WatInfra] + [SysUWM] For river system management: [RemSens]+[LAND] For hydraulic structures and natural hazard processes: [SOIL]+[LAND]

Note: There is some overlap of lecture times for some of the courses in the different module – even for some of the module combinations recommended above. With 14 modules this cannot be avoided. Students that want to take module combinations with conflicting schedules can choose to take a conflicting course one year later (e.g., in the 3rd rather than the 1st semester or in the 4th rather than the 2nd semester).

And: The MSc thesis can only be started if all required modules, 15 CP of optional modules and 10 CP of the Experimental and Computer laboratory have been completed.

➔ So, maybe students have to extend their studies in case of choosing the recommended optional modules above.

3.2.6 **Electives and Science in Perspective**

The purpose of electives is to extend students theoretical and methodological knowledge. Students can choose subjects to suit themselves from the complete range of teaching courses offered by ETH Zurich and the University of Zurich.

At least 12 credit points must be acquired from the electives and 2 credit points from the “Science in Perspective” program (D-GESS).

Free Electives

The teaching courses that are available to choose are published in the Course Catalogue. The information provided in the Course Catalogue at www.vvz.ethz.ch is binding.

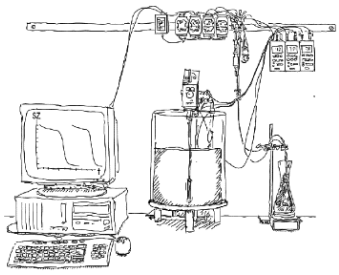
In the area of free electives, language courses (any level) from the range offered by the Language Centre of the University of Zurich can also be credited.
Registration and enrolment for the courses take place directly at the Language Centre https://www.sprachenzentrum.uzh.ch/en.html

“Science in Perspective” (SiP) program of the Department of Humanities, Social and Political Sciences (D-GESS)

Regarding the “GESS Science in Perspective” course: Only the courses listed in the Course Catalogue with category "GESS Science in Perspective" are accepted.

3.3 Experimental and Computer Laboratory

During the 1st and 2nd semesters, students work in the Experimental and Computer Laboratory to learn the essential working methods applied in Environmental Engineering. Students refine their experimental working techniques in relation to their chosen major, and study different methods of measurement and investigation and various software applications.



The work is generally organized in the form of projects which are handled in groups. Work in the Experimental and Computer Laboratory is treated as a one-year course and is given a single final grade. Projects are directly linked to individual modules. Courses in these modules are pre or co-requisites for participating in the specific projects. For information on specific projects see http://www.luiw.ethz.ch/lehre/experimental-and-computer-laboratory.html.

3.4 Declaration of Originality

Signing the Declaration of Originality is regarded as an official component of the process of submitting any piece of written work compiled at ETH Zurich. For co-authored work all co-authors are required to declare with their signatures that they are satisfied with the entire contents of the document.

The signature attests that the respective student has read the information sheet on plagiarism, has compiled his/her work independently, and has respected the source citation rules normal within his/her respective discipline.
www.ethz.ch/students/exams/plagiarism_s_en.pdf

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Declaration of Originality

This sheet must be signed and enclosed with every piece of written work submitted at ETH.

I hereby declare that the written work I have submitted entitled

_____

is original work which I alone have authored and which is written in my own words.*

Author(s)

Last name _____ First name _____

3.5 Master Project

The Master project is part-time for a period of one semester. Students typically do the MSc project in parallel to taking classes in the 3rd semester starting in the first week of the semester. The goal of the Master project is to solve a practical problem or answer an engineering science question in the given amount of time (i.e., 50% time during 14 weeks). The MSc project must be linked to the major or one of the optional modules. The supervisor for MSc project must be (a) Professor at ETH Zürich and (b) part of the environmental engineering curriculum (i.e., part of one of the required or optional modules). Exceptions must be approved in writing by the director of studies.

Students are responsible for agreeing on a subject with the supervisor and registering in myStudies before they start their research. 12 credit points are awarded for a successfully completed MSc project. A failed project can be repeated once. If it is repeated, a new topic must be chosen. The project can be repeated under the supervision of a different professor from the same major. For details please see 8.2 “Guidance for MSc Theses and Projects in Environmental Engineering” and also 8.3 “Extended Guidance for MSc Projects in Environmental Engineering”.

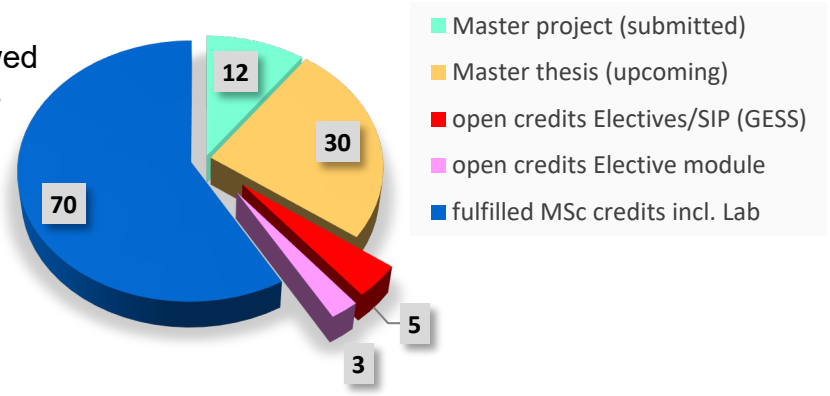
3.6 Master Thesis

The Master thesis is the final part of your studies. It lasts 28 weeks (6 months plus 2 weeks for public holidays and short time absence), and should be linked to the major or one of the optional modules. Students are responsible for agreeing on a subject and start/end date with their supervisor and submit this information in myStudies before they start their thesis research. The MSc thesis normally starts in the first week of the 4th semester.

Like for the MSc project, the supervisor for MSc thesis must be (a) Professor at ETH Zürich and (b) part of the environmental engineering curriculum (i.e., part of one of the required or optional modules). Exceptions must be approved in writing by the director of studies.

The MSc thesis can be started only if the full BSc and 70 CP of the MSc have been completed. Of these 70 CP at least 36 CP of the required modules, 15 CP optional modules and 10 CP of the Experimental and Computer laboratory must have been completed. The MSc project must have been submitted.

That means, only 8 CP are allowed to miss before the Master thesis can be started.
This can be 8 CP in the category Electives/Science in Perspective OR 5 CP in the category Electives/ Science in Perspective and 3 CP in an Elective module.



The Master thesis can only be terminated in exceptional circumstances. A written request should be submitted to the Vice-Rector for Study Programmes as soon as possible, giving the reason. After the first half of the period of work on the thesis, there must be a really compelling reason for stopping, otherwise it is not possible. (https://www.ethz.ch/en/the-eth-zurich/organisation/vice-rectors.html)

30 credit points are awarded for a satisfactory Master thesis (minimum grade 4.0). An unsatisfactory Master thesis can be repeated once. A different topic must be chosen; and there can be a change of supervisor.
For details please see 8.2 “Guidance for MSc Theses and Projects in Environmental Engineering”.

3.7 Student exchange

For any Master students who are particularly interested, there is the option of spending a semester at ETH Lausanne or at a foreign university after the 3rd semester. Because of the one-year course in the Experimental and Computer Laboratory and the lectures on major subjects, it is not possible to do an exchange during the first three semesters. Since the MSc program lasts only 4 semesters, it is not recommended to spend more than one semester away.

Students interested in an exchange should make enquiries early with the Student Exchange Office at ETH Zurich (www.mobilitaet.ethz.ch) and with the Administration Office for the course. To prepare for and plan a period of study away, it is recommended that students contact the student exchange advisor for the Environmental Engineering course (see also the section on 7.3 Who - What - Where).
The total duration of the course should not be extended by any student exchange.

Approval for a student exchange will be given by the Lecturer of each changed course and the Mobility Advisor for the Environmental Engineering programme.

Course exchange possibilities

<table>
<tr><th>Bachelor
Courses</th><th>ETH Zurich
Bachelor
Environmental
Engineering</th><th>ETH Zurich
Bachelor
Environmental
Science</th><th>other Bachelor</th></tr>
<tr><td>Compulsory modules</td><td>Not allowed</td><td>Not allowed</td><td>Not allowed</td></tr>
<tr><td>Exp. Comp. Lab</td><td>Not allowed</td><td>Not allowed</td><td>Not allowed</td></tr>
<tr><td>Optional modules</td><td>Allowed</td><td>Not allowed</td><td>Not allowed</td></tr>
<tr><td>Electives</td><td>Allowed</td><td>Allowed</td><td>Not allowed</td></tr>
<tr><td>Master Project</td><td rowspan="2">Allowed is one of these:
Master Project OR
Master Thesis</td><td>Not allowed</td><td>Not allowed</td></tr>
<tr><td>Master Thesis</td><td>Allowed</td><td>Allowed</td></tr>
</table>

3.8 Graduating as a Master

In order to gain the title of Master, at least 120 credit points (CP) must have been awarded. Provided they have evidence of these required credit points, students can apply to the department to be awarded the Master degree within four years of starting the Master course.

The degree application should be made electronically via the student portal mystudies. All performance assessments should be entered in the relevant categories.

The following minimum requirements apply to the various categories of the course:

Category	Min. no. of CP
a. Compulsory modules	36
b. Optional modules	18
c. Master Project	12
d. Experimental and Computer Laboratory	10
e. Electives	12
f. GESS Science in Perspective	2
g. Master thesis	30
	Total 120

A maximum of 130 credit points can be counted towards a Master degree. A student can apply to have additional courses or credit points listed on a separate sheet accompanying the final certificate.

3.9 Diploma ceremony

Once a year a diploma ceremony is held at the Department of Civil, Environmental and Geomatic Engineering for those students who have successfully completed their Master program during the last year.

On this occasion, graduates have the opportunity to give their families, colleagues, friends and acquaintances an insight into student life.

Invitations to the diploma ceremony are normally sent by email and post. Therefore, when applying for the Master degree, students must leave an email address and a postal address with the Administration Office to which the invitation can be sent, so that graduates can be reached after they have left ETH.

4 Shuttle bus & Lecture times

4.1 ETH Link

ETH Link (shuttle bus) connects the campuses ETH Zentrum and ETH Hönggerberg from Monday to Friday. The shuttle buses leave every 20 minutes and stop en-route at "Haldenegg" (tram no. 7), about 600 metres from Zurich main station.

The first buses leave at 7.06 and 7.34 a.m. at Zurich main station (bus stop "Bahnhofplatz/HB", in front of Hotel Schweizerhof) and go to Campus Hönggerberg without stopping at ETH-Zentrum (and during the semester also 7.21 a.m.). Between 7.54 a.m. and 6.34 p.m., the buses travel directly between the Zentrum and Hönggerberg sites.

Departure times from Hönggerberg: x.14, x.34 and x.54.
and during the semester also from Hönggerberg x.44
Departure times from Zentrum: x.10, x.30 and x.50.
and during the semester also also from Zentrum x.00

During the day, the buses travelling to the centre (first rounds 07.06 and 07.34, and during the semester 7.44 a.m.) continue via Haldenegg on to ETH Zentrum, “Unterführung Polyterrasse”.
The last rounds of the day (6.14, 6.34 and 6.54 p.m., during the semester also 6.44 p.m.) do not go via ETH Zentrum, but directly to Zurich main station.

4.2 Lecture times

Lectures generally last for 45 minutes. The left column of the table indicates the times published in the Course Catalogue.
Lectures held at the ETH main campus (ETH Zentrum) start 15 minutes later (i.e., 08:15 instead of 08:00).

Lectures held at the ETH Hönggerberg campus start 15 minutes earlier than the time published (i.e., 07:45 instead of 08:00). Lectures held in the mornings in buildings HIF, HIL, HIP, HIQ and HIR begin on the hour as indicated in the Course Catalogue.

Entries in Course Catalogue	**Zentrum** All buildings	**Hönggerberg** HIF, HIL, HIP, HIQ, HIR	**Hönggerberg** All other buildings
08:00–09:00	08:15-09:00	08:00-08:45	07:45-08:30
09:00–10:00	09:15-10:00	08:50-09:35	08:45-09:30
10:00–11:00	10:15-11:00	09:45-10:30	09:45-10:30
11:00-12:00	11:15-12:00	10:45-11:30	10:45-11:30
12:00–13:00	12:15-13:00	11:45-12:30	11:45-12:30
13:00–14:00	13:15-14:00	12:45-13:30	12:45-13:30
14:00–15:00	14:15-15:00	13:45-14:30	13:45-14:30
15:00–16:00	15:15-16:00	14:45-15:30	14:45-15:30
16:00–17:00	16:15-17:00	15:45-16:30	15:45-16:30
17:00–18:00	17:15-18:00	16:45-17:30	16:45-17:30
18:00–19:00	18:15-19:00	17:45-18:30	17:45-18:30
19:00-20:00	19:15-20:00	18:45-19:30	18:45-19:30

5 Additional information

5.1 Student Association

Students at the D-BAUG have a mandatory right to contribute to the tripartite Teaching Commission (lecturers/assistant professors/students) and at the departmental conference. The responsibilities of the Teaching Commission include preparing reviews of course regulations, approving examination procedures, making suggestions for improving courses and much more. More information can be found at www.uk.baug.ethz.ch.

It is also worth becoming involved in student politics through the Geospatial and Environmental Engineering Student Organization (GESO). The experience students acquire there will be highly beneficial in their subsequent professional lives.

5.2 Relaxing from your studies

The Academic Sports Association Zurich (ASVZ) offers a varied range of over 80 sports as well as the possibility of individual training. The ASVZ fee is included in the mandatory student fees, and includes the regular classes held throughout the year. For special outdoor activities, courses or camps students must register in advance and pay an extra fee. Students can also participate in team sports such as football or badminton, or take classes such as yoga or jazz dance. The most popular course of all is fitness training, known as “Kondi” (Konditionstraining), which takes place several times a day during lunch breaks and in the evening.
At the beginning of each semester a pocket-sized sports timetable (“Sport-Fahrplan”) is sent to students which lists alphabetically all training sessions, courses and services as well as administrative and organizational details. The ASVZ website (www.asvz.ch) also provides information on the courses offered.
The ASVZ has several sport centres, two of which are located on ETH Zurich premises (Polyterrasse and Campus Hönggerberg). When entering the facilities students will be asked to show their student cards. They should also bring their own padlocks for the lockers.

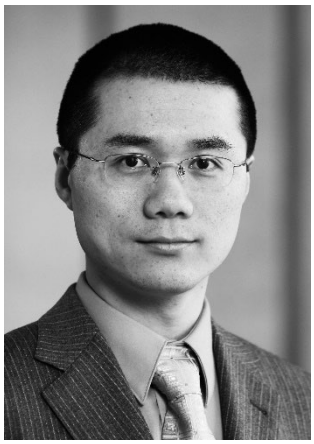
Zurich, Switzerland’s largest city, offers visitors a wealth of captivating culture. In addition to internationally famous cultural establishments such as the Opera House, Schauspielhaus (Theatre), Tonhalle (Concert hall) and Kunsthaus (Art museum), there are countless museums, smaller theatres, restaurants, bars, discos etc. to enjoy.
Every Monday evening all Zurich cinemas offer reduced-price tickets, and every afternoon you can get a reduction by showing your student card. Films are usually shown in the original language, with German and French subtitles.
The online cinema program is available at: www.cineman.ch/en

6 Teaching for Environmental Engineering

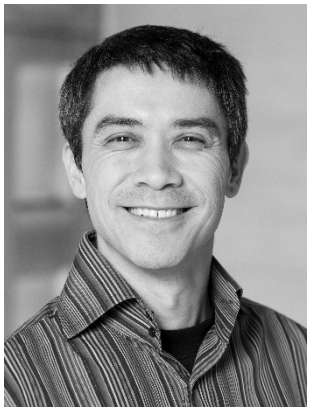
Most of the teaching on the Environmental Engineering course is provided by the Institute for Environmental Engineering from D-BAUG. For the major River and Hydraulic Engineering course are provided by the Laboratory for Hydraulics, Hydrology and Glaciology (VAW, D-BAUG) and for the module Soil by D-USYS.

6.1 Chairs of the Institute of Environmental Engineering

The Institute for Environmental Engineering currently employs the following professors:

	**Chair of Air Quality Control** **Director of Studies in Environmental Engineering** Prof. Dr. Jing Wang HIF D 93.2, Laura-Hezner-Weg 7, 8093 Zurich Phone: +41 44 633 36 21 E-mail: jing.wang@ifu.baug.ethz.ch
	**Chair of Hydrology and Fluvial Systems** **Deputy Director of Studies in Environmental Engineering** Prof. Dr. Peter Molnar HIF D 20.1, Laura-Hezner-Weg 7, 8093 Zurich Phone: +41 44 633 29 58 E-mail: peter.molnar@ifu.baug.ethz.ch
	**Chair of Hydrology and Water Resources Management** Prof. Dr. Paolo Burlando HIF D 87.2, Laura-Hezner-Weg 7, 8093 Zurich Phone: +41 44 633 38 12 E-mail: paolo.burlando@ifu.baug.ethz.ch

	**Chair of Groundwater and Hydromechanics** Prof. Dr. Roman Stocker HIF D 93.1, Laura-Hezner-Weg 7, 8093 Zurich Phone: +41 44 633 70 86 E-mail: romanstocker@ethz.ch
	**Chair of Ecological Systems Design** Prof. Dr. Stefanie Hellweg HIF D 87.1, Laura-Hezner-Weg 7, 8093 Zurich Phone: +41 44 633 43 37 E-mail: stefanie.hellweg@ifu.baug.ethz.ch
	**Chair of Quantitative Sustainability Assessment** Prof. Dr. Stephan Pfister HIF D 85.2, Laura-Hezner-Weg 7, 8093 Zürich Phone: +41 44 633 75 71 E-mail: stephan.pfister@ifu.baug.ethz.ch
	**Chair of Earth Observation and Remote Sensing** Prof. Dr. Irena Hajnsek HIF D 89.2, Laura-Hezner-Weg 7, 8093 Zurich Phone: +41 44 633 74 55 E-mail: hajnsek@ifu.baug.ethz.ch

	**Chair of Process Engineering in Urban Water Manag.** Prof. Dr. Eberhard Morgenroth HIF D 89.1, Laura-Hezner-Weg 7, 8093 Zurich Phone: +41 44 633 48 30 E-mail: eberhard.morgenroth@ifu.baug.ethz.ch
	**Chair of Urban Water Systems** Prof. Dr. Max Maurer HIF D 26.1, Laura-Hezner-Weg 7, 8093 Zurich Phone: +41 44 633 30 67 E-mail: max.maurer@ifu.baug.ethz.ch
	**Chair of Urban Water Management** Prof. Dr. Kai Udert EAWAG Überlandstrasse 133, Postfach 611, 8600 Dübendorf Phone: 058 765 53 60 E-mail: udertkai@ethz.ch

6.2 Laboratory for Hydraulics, Hydrology and Glaciology (VAW)

for the major River and Hydraulic Engineering

	**Chair of Hydraulic Engineering and Director of the Laboratory for Hydraulics, Hydrology and Glaciology (VAW)** Prof. Dr. Robert Boes HIA C 57, Hönggerbergring 26, 8093 Zurich Phone: +41 44 632 40 90 E-mail: boes@vaw.baug.ethz.ch

6.3 D-USYS: Chair of Physics of Soils and Terrestrial Ecosystems

for the module Soil

	**Chair of Physics of Soils and Terrestrial Ecosystems** (Department of Environmental Systems Sciences D-USYS) Prof. Dr. Andrea Carminati CHN F 29.1, Universitätstrasse 16, 8092 Zurich Phone: E-mail: andrea.carminati@usys.ethz.ch

6.4 Environmental Engineering Laboratory

The laboratory team is part of the Institute of Environmental Engineering.

	**Head of Experimental and Computer Laboratory** Daniel Braun HIF C 85.1, Laura-Hezner-Weg 7, 8093 Zurich Phone: +41 44 633 24 54 E-mail: braun@stab.baug.ethz.ch
	**Experimental and Computer Laboratory** Luzia von Känel HIF C 85.2, Laura-Hezner-Weg 7, 8093 Zurich Phone: +41 44 633 38 48 E-mail: vonkaenel@ifu.baug.ethz.ch

7 Advice

7.1 Points of contact

General information (for instance on enrolment, receipt of documents, and issuance of academic transcripts) is given by the

Info Desk for Students D-BAUG, HIL E 32.1
Opening hours please see here
https://baug.ethz.ch/en/studies/environmental-engineering/contacts/infoschalter.html

For questions **relating to the Environmental Engineering study programme**, please contact the

Environmental Engineering Administration Office
Campus Hönggerberg
Stefano-Franscini-Platz 5, HIL E 32.2
8093 Zurich, Switzerland
Phone: +41 44 633 71 93
E-mail: environmentalengineering@ethz.ch
www.environmentalengineering.ethz.ch

The Environmental Engineering Administration Office is available by email and phone from Monday to Friday. If you need, you can also make a personal appointment or just drop in, if you are in HIL building.

In the case of personal problems, a number of advice centres are available to students, see 7.3.

- Psychological Counseling Service
- Student Advisory Service
- Disability Advisory Service

7.2 Specialist advice

Specialist advice and support can also be provided by the Assistant Professors, lecturers and Professors (see also 6). It is important that if students are experiencing any difficulties with the content of the course they request assistance from these experts at an early stage.

Details about the learning objectives and content of specific lectures can be found in the ETH Zurich Course Catalogue (www.vvz.ethz.ch).

Other useful sources of information include:

www.ethz.ch	Studying at ETH Zurich
www.baug.ethz.ch	Studying or doctorate at the D-BAUG
www.umwelting.ethz.ch	Studying Environmental Engineering at ETH Zurich
www.geso.ethz.ch	Geospatial and Environmental Engineering Student Organ.

7.3 Who - What - Where

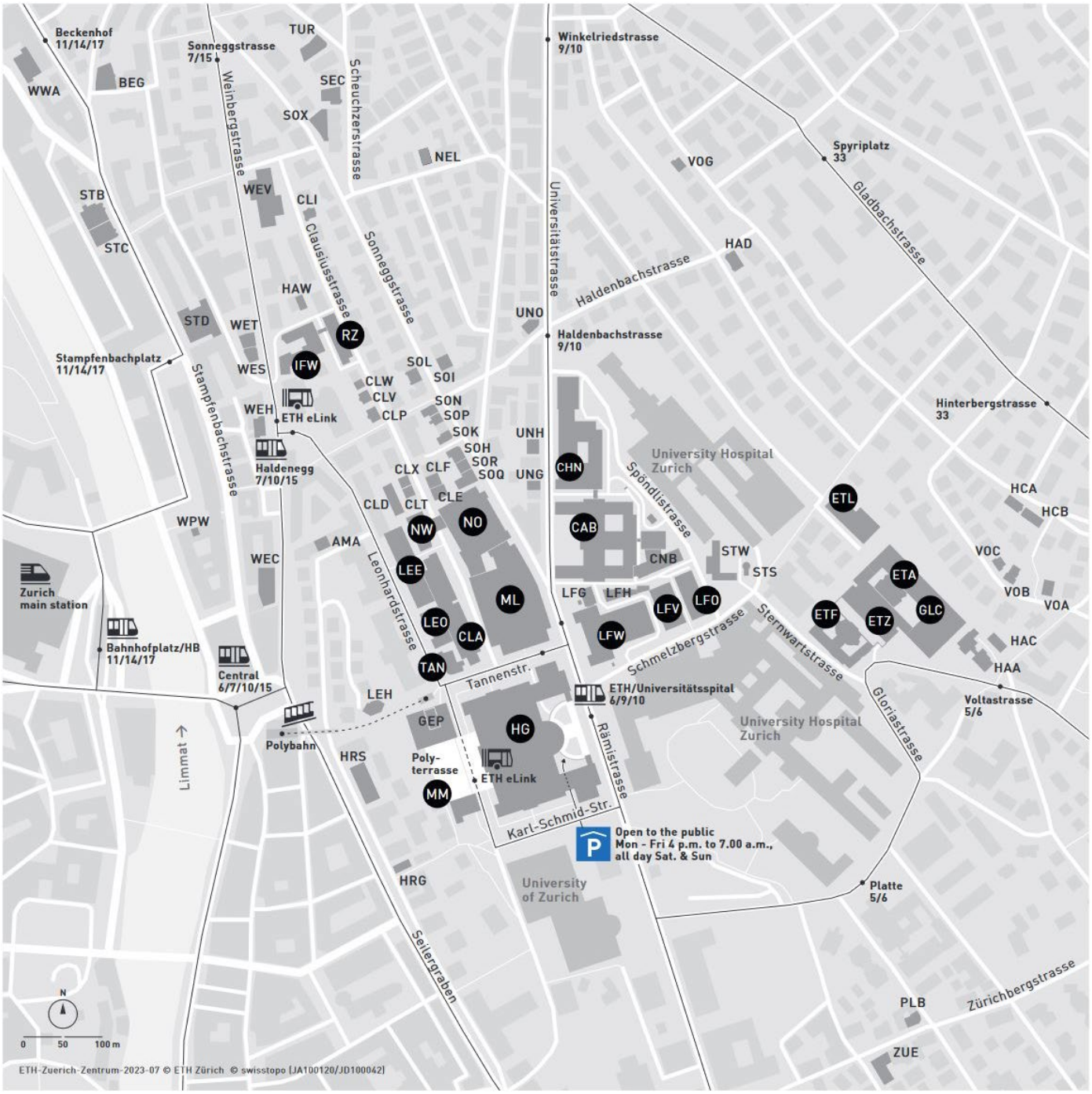
Administration Office	**Environmental Engineering Administration Office** Ms Sabine Schirrmacher Campus Hönggerberg, HIL E 32.2 Stefano-Franscini-Platz 5, 8093 Zurich Phone: +41 44 633 71 93 E-mail: umwelting@ethz.ch, www.umwelting.ethz.ch
Director of Studies	**Director of Studies in Environmental Engineering** Prof. Dr. Jing Wang Campus Hönggerberg, HIF D 93.2 Laura-Hezner-Weg 7, 8093 Zurich Phone: +41 44 633 36 21 E-mail: umwelting@ethz.ch www.baug.ethz.ch/en/studies/environmental-engineering/contacts.html
Student Organization	**GESO, Geospatial and Environmental Engineering Student Organization** Campus Hönggerberg, HXE C 25, 8093 Zurich Phone +41 44 633 27 84 E-mail: praesidium@geso.ethz.ch, https://geso.ethz.ch
Academic Services	**Registrar's Office** ETH Zurich, Campus Zentrum, HG F 19, Rämistrasse 101, 8092 Zurich Phone +41 44 632 30 00 E-mail: registrar@ethz.ch www.ethz.ch/students/en/studies/administrative.html
Admission	**Admissions Office** ETH Zurich, Campus Zentrum, HG F 21 Rämistrasse 101, 8092 Zurich Phone +41 44 633 81 00 E-mail: master@ethz.ch https://www.ethz.ch/en/studies/registration-application/master.html
Student exchange	**Student Exchange Office** ETH Zurich, Campus Zentrum, HG F 23.1, Rämistrasse 101, 8092 Zurich Phone +41 44 632 61 61 E-mail: exchange@ethz.ch, www.exchange.ethz.ch **Mobility Advisor** Ms Sabine Schirrmacher (see also Administration Office)

Examinations Office	**Examinations Office** ETH Zurich, Campus Zentrum, HG F 18, Rämistrasse 101, 8092 Zurich Phone +41 44 632 20 68 E-mail: exams@ethz.ch, www.exams.ethz.ch
Advice for students from abroad	**International Student Support** ETH Zurich, Campus Zentrum, HG F 22.3, Rämistrasse 101, 8092 Zurich Phone +41 44 632 20 95 E-mail: international@sts.ethz.ch www.ethz.ch/en/studies/international-immigration-housing.html
Scholarships	**Financial Aid Office** ETH Zurich, Campus Zentrum, HG F 22.1, Rämistrasse 101, 8092 Zurich Phone +41 44 632 20 88 E-mail: studienfinanzierung@sts.ethz.ch www.ethz.ch/en/studies/financial.html
Housing Office	**Housing Office of University / ETH Zurich** Campus Zentrum, Sonneggstrasse 27, 8092 Zurich Phone +41 44 632 20 37 E-mail: zimmervermittlung@ethz.ch, www.wohnen.ethz.ch
Psychological Counseling Center	**Psychological Counseling Service** Plattenstrasse 28, 8032 Zurich Phone +41 44 634 22 80 E-mail: pbs@ad.uzh.ch, www.pbs.uzh.ch/en
Student advisory service / Coaching	**Student advisory service / Coaching** Ms Ines Danuser ETH Zurich, Campus Zentrum, HG F 68.4 Rämistrasse 101, 8092 Zurich Phone +41 44 633 83 29, E-mail: ines.danuser@sts.ethz.ch www.ethz.ch/students/en/advice/student-advisory-service-coaching.html
Disability advisory service	**Disability advisory service** Ms Karin Züst Santschi (karin.zuest@sts.ethz.ch) and Ms Sibilla Flury (sibilla.flury@sts.ethz.ch) ETH Zurich, Campus Zentrum, Main building Rämistrasse 101, 8092 Zurich Phone +41 44 632 35 92 and +41 44 632 27 71 www.ethz.ch/students/en/advice/disability-advisory-service.html

7.4 Campus maps

Campus Hönggerberg

Campus Zentrum



8 Annex

8.1 Qualification profile

Introduction

The Master's degree programme in Environmental Engineering enables students to analyse complex environmental problems and develop technical solutions. The environmental engineering sciences address both the use of important resources such as water, soil and air and the conservation of valuable natural systems. The degree programme introduces environmental engineers to the scientific, engineering and social science foundations required to shape and manage these systems.

Domain-specific knowledge and understanding

Graduates with a Master's degree in Environmental Engineering

- have in-depth specialist knowledge in one of the specialisations Urban Water Management, Environmental Technologies, Resource Management, Water Resources Management or River and Hydraulic Engineering;
- possess specialist knowledge and/or broad-spectrum knowledge from the electives completed;
- have solid specialist knowledge acquired in project work and the Master's thesis.

Skills

Graduates with a Master's degree in Environmental Engineering

- recognise and understand complex interrelationships in the human-environment system;
- are able to analyse problems and reduce them to what is significant;
- are able to efficiently gather the bases for target-oriented solutions;
- are able to independently select measurement, analysis and modelling methods, apply them with certainty and develop them;
- are able to develop targeted, sustainable solutions which take into account ecological, economic, social and ethical factors;
- are able to address interconnections with neighbouring disciplines;
- are able to implement new working and application methods from the area of environmental engineering;
- are able to recognise uncertainties in solutions and allow for them.

Personal and social competences

Graduates with a Master's degree in Environmental Engineering

- are able to independently and continually update their personal knowledge regarding the state of science and technology and to professionally apply new knowledge to authentic problems;
- are able to apply modern project management methods, split complex tasks according to the respective situation and address them in a team;
- are able to lead projects and teams;
- are able to coherently communicate findings from their work orally and in writing to both specialists and lay persons.

8.2 Guidance for MSc Theses and Projects in Env. Engineering

1. Purpose
This document provides a framework with basic requirements for supervising, reviewing, and evaluating

- MSc Project
- MSc Thesis

in the MSc Environmental Engineering program at ETH. It is the responsibility of both student and supervisor to review and follow this guidance. If there is reason to deviate from recommendations in this document then this should be discussed early in the process and not last minute (e.g., asking only when submitting the final document is too late).

2. Background
Some key common requirements are fixed in this document. This document complements the official rules[1] and other guidance documents[2].

3. Content
The main information is summarized in the table below. Some additional information is provided in the Appendix.

4. Comments and suggestions
Comments and suggestions are welcome should be directed to Professor Eberhard Morgenroth (Director of studies for Environmental Engineering).

	MSc Project	**MSc Thesis**	**Comments**
Duration	14 weeks (50% time), 12 CP	6 months (100% time), 30 CP	The topic of the MSc project and MSc thesis must be linked to the major chosen for the MSc program.
Written problem statement provided by the supervisor at the start	Required	Required	
Enrollment in myStudies before start	Required	Required	

[1] Studienreglement 2016 für den Master-Studiengang Umweltingenieurwissenschaften, vom 13. Oktober 2015

[2] Available at http://www.umwelting.ethz.ch -> documents

	MSc Project	MSc Thesis	Comments
Formal review meetings	2 intermediate meetings 1 final presentation	2 intermediate meetings 1 final presentation	*Suggestions:* Fix dates for these meetings already at the start. Supervisors can decide on more meetings with the student. Experience shows that it is good to have two formal intermediate meetings to identify potential problems. The first intermediate meeting allows to review the problem statement and the availability of necessary methods and tools. By the time of the second intermediate meeting the student will collected the majority of results and these can be critically discussed. Intermediate meetings provide opportunities to make changes to the original problem statement (larger changes should be agreed upon in writing). For the day-to-day supervision it is beneficial to clearly define expectations in terms of time provided by assistants to support the student. Assistants and supervisors should enable students to do excellent work – but they should not be "holding the students hands" along every step of the way. Time involvement for supervision depends on the specific project.
Maximum number of pages within the written report	25 pages + Appendix	30 pages + Appendix	Page limit refers to the main section of the thesis (Introduction, Scope and Objective, Materials and Methods, Results, Discussion, Conclusions) but it does not include the front parts, References, and Appendix. The maximum number of pages is a strong suggestion – it is important that students learn to communicate using a limited number of pages. If a student has a good reason to use more pages and the supervisor agrees then it is OK to go beyond the maximum number of pages.
Structure of report	See Appendix	See Appendix	
Citations	Follow ETH "Citation Etiquette"	Follow ETH "Citation Etiquette	Format must be complete and consistent. The “Citation Etiquette” can also be found here: http://www.umwelting.ethz.ch/download/index_EN Citations should follow a consistent format (e.g., Author-Date)[3].

[3] See for example: http://www.chicagomanualofstyle.org/tools_citationguide.html

	MSc Project	MSc Thesis	Comments
Signed declaration of originality[4]	Required by ETH	Required by ETH	The declaration has to be implemented in each written report (including its PDF).
What must be submitted at the end?	At least the electronic version and by arrangement also a hard copy	At least the electronic version and by arrangement also a hard copy	The electronic version should be submitted compiled a CD or a memory stick or pdf to the supervisor and it should include final versions of written reports, poster, presentations, raw data, computer implementations, calculations etc.
Final presentation	20 min presentation + 10 min discussion Open to public At least supervisor and one additional person (e.g., assistant)	25 min presentation + 10 min discussion Open to public At least supervisor and one additional person (e.g., assistant)	Date of the final presentation should be fixed already at the start. The final presentation is usually one or two weeks before the end of the overall duration. Students should learn to communicate using a limited amount of time. If a student has a good reason to use more time and the supervisor agrees then it is OK to extend the duration of the presentation. An extension of the duration of the presentation must be explicitly agreed upon before the day of the final presentation.
Poster	Not required	Required Format: A0	Please use the ETH template for scientific posters unless agreed otherwise with the supervisor.
Grading	Practical work: 20% Final presentation: 20% Technical report: 60%	Practical work: 10% Final presentation: 20% Technical report: 60% Poster: 10%	The part “practical work” includes independence during the project, organization of work, experiments, etc. No clear definition can be provided as it depends on the type of work (e.g., lab experiments, group work, preparation and realization of field trips).
Evaluation	Written feedback by supervisor provided to the student with the grade.	Written feedback by supervisor provided to the student with the grade.	Some general aspects which should be taken into account can be found below.

[4] https://www.ethz.ch/content/dam/ethz/main/education/rechtliches-abschluesse/leistungskontrollen/declaration-originality.pdf

	MSc Project	MSc Thesis	Comments
Minimum duration to keep project and thesis documents after completion	2 years	2 years	The final thesis/project and background documents that were submitted by the student with the thesis (e.g., on a CD) must be archived by the responsible professorship for the indicated duration.
Possibility for external project/thesis with industry, another university, or a professor outside of IfU	Yes, but must identify responsible IfU professor who reviews the problem statement and decides on the grade	Yes, but must identify responsible IfU professor who reviews the problem statement and decides on the grade	The on-site supervision, detailed evaluation, and suggestion for a grading must be done by the external partner. But for every student there must be a responsible professor from IfU. It is the responsibility of the IfU professor to make the final decision on the grading. In many cases the IfU professor will follow the advice of the external partner but ultimately the grade is decided by the IfU professor. It is useful to have formal intermediate meetings including the external advisor, the student, and the ETH professor (if the student is abroad then these can be done via Phone or Skype). The students are required to give a final presentation at ETH.

5. Appendix

Generally recommended structure of a technical report of a project or thesis:

- Summary
- Introduction
- Scope and Objective
- Materials and Methods
- Results
- Discussion (can be combined with results)
- Conclusions
- References
- Appendix

Criteria which should be taken into account for report evaluation:

- Layout (20%)
    - Form
    - Text structure
- Content (80%)
    - Proposed tasks addressed in report
    - Critical evaluation of data and results
    - Calculations and results
    - Discussions and conclusions
    - Summary

Criteria which should be taken into account for presentation evaluation:

- Content
- Presentation technique
- Use of media
- Expression
- General impression

Criteria which should be taken into account for poster evaluation:

- Layout
- Title
- Graphics vs. text boxes
- Expressiveness
- Content
- Conclusions
- Discussion Potential

Criteria which should be taken into account for practical work:

- Time management
- Organized approach of tasks and milestones
- Independence during work and organized interactions with advisors
- Critical assessment of approach
- Organized work in laboratory, field, or with project partners (if applicable) and orderly data and metadata management.

There are many web based resources available on writing reports, preparing posters, scientific presentations, literature search. Here are some examples:

- Advice on preparing a student report and scientific writing in general
    - ETH Lehrentwicklung und -technologie (LET): http://www.let.ethz.ch/docs/WissenschaftlichesSchreiben
- Databases for finding and downloading scientific publications and journals
    - http://www.library.ethz.ch/
    - ISI Web of Knowledge (http://apps.webofknowledge.com/)
    - Science Direct (http://www.sciencedirect.com)
    - Scopus (http://www.scopus.com/)
    - Google Scholar (http://scholar.google.com/)

Further information and templates for projects and for later for the evaluation of student work have been prepared within individual professorships and are available from these professorships upon request.

8.3 Extended Guidance for MSc Projects in Env. Engineering

The MSc in Environmental Engineering includes coursework, the Experimental and Computer Laboratory, the MSc Project, and the MSc Thesis. The purpose of this document is to provide some guidance for the MSc Project and to outline how the MSc Project is different from the MSc Thesis[5].

1 Overall goal of the MSc Project

The MSc Project provides students with the opportunity to work on real-world, open-ended, interdisciplinary challenges, building on what they have learned in their studies. The project can focus on engineering design, evaluation of an existing process, developing an innovative idea, or investigating a scientific question. In the MSc Project students have the challenge and the opportunity to connect their theoretical knowledge from their courses to a real-world problem. In the real-world the problem may not always be clearly defined, there is limited information and data, and questions must be answered within a limited amount of time. Students need to critically assess the specific question and the information provided, they must be aware of their limits, and then make decisions using their best judgment.

2 Identifying suitable topics for the MSc Project

It is the responsibility of the students to identify a suitable topic for the MSc Project. There are different possibilities for students to identify topics:

- Students are encouraged to propose and define their own project. Projects can be carried out with an external industry partner or they can be independent studies. In either case the project must be approved by a professor (as defined in the regulation). Students should start early to get feedback and guidance from the professor.
- Professors can support students who have not identified their own project by proposing ideas for a project based on the professor's own research projects or projects solicited from industry, government agencies, and other partners. Project ideas will be posted by the individual professorships. Students should directly contact the contact person listed for that project. The project will then be directly defined between the student, the contact person, and the professor.

3 Organization of the MSc Project

- It is part of the learning objective of the MSc Project and a responsibility of the students to translate initial ideas or questions into specific and solvable research questions and approaches.
- Students must have the approval of their suggested research question and approach from a professor before starting on a particular MSc Project.

[5] Students should also consider the "Study Guide" for the MSc Program and the "Guidance for BSc and MSc Theses and Projects in Environmental Engineering" available at https://www.baug.ethz.ch/studium/umwelting/dokumente.html

- Students are strongly encouraged to work in teams of 2 or 3 students.
    - A team prepares a single joint final report and final presentation.
    - Students can distribute tasks within the team, but each team member is responsible for all content in the report and in the final presentation. Each team member must be ready to answer questions during intermediate meetings and in the discussion after the final presentation.
    - As described in the "Guidance for BSc and MSc Theses and Projects in Environmental Engineering" the maximum number of pages for MSc Projects is 25 pages. This page limit also applies to group projects unless otherwise agreed upon.
    - There will be a joint final grade (i.e., same for all team members) for the final report and final presentation. Grading for the practical work can be adjusted for individual efforts of each team member.[6] Thus, the overall grade of each team member need not be the same.
    - Teamwork is rewarding but can also be challenging. Teams should consult with their professor if there are major problems that cannot be resolved otherwise.[7]
- Every team has a responsible professor assigned as their mentor.
- Every team must have a direct supervisor assigned for the direct supervision. This direct supervisor can be a person from the practice partner or from ETH.
- The MSc Project corresponds to 12 credit points attained over a period of 14 weeks. At ETH one credit point (CP) corresponds to 25 to 30 hours of work for the student. That means the overall MSc Project corresponds to 300 to 360 hours or 20 - 25 hours per week for the 14-week period.
- Schedule
    - March/April: Professors solicit project ideas from practice partners and from their own research groups.
    - May: Project ideas are advertised and student teams agree with professors on project topics. The goal is that students starting their MSc Project in the autumn semester have their topic, team, and professor identified by the end of the spring semester.
    - First week of the autumn semester: Start of MSc Project.
- Milestones
    - Week 2: Students finalize a document defining detailed research questions and approaches (4 – 5 pages) with specific information on project title, summary, brief literature review (if appropriate), problem statement, design or research approach, schedule with milestones, and required resources.
    - Week 4: First intermediate presentation.
    - Week 9: Second intermediate presentation.
    - Week 13: Preliminary draft of final report.
    - Week 14: Oral presentation and final report.

[6] See also the "Guidance for BSc and MSc Theses and Projects in Environmental Engineering" available at https://www.baug.ethz.ch/studium/umwelting/dokumente.html regarding grading.

[7] Students should consult with their professor if a conflict arises in the team that cannot be worked through by the team. As you will find out, group work is not always easy: team members sometimes cannot prepare for or attend group sessions because of other responsibilities, and conflicts often result from differing skill levels and work ethics. When teams work and communicate well, however, the benefits more than compensate for the difficulties. One way to improve the chances that a team will work well is to communicate and agree beforehand on what everyone on the team expects from everyone else. If repeated efforts to improve team functioning (including faculty intervention) fail, a nonparticipant may be fired by unanimous consent of the rest of the team and/or a team member doing essentially all the work may quit.

4 Frequently Asked Questions (FAQs)

- How are the MSc Project and Thesis different?
    - The MSc Project is done in parallel with courses in the 3rd semester (12 CP) while the MSc Thesis is done full-time for 6 months (30 CP).
    - The MSc Project should be done in teams while the MSc Thesis must be done individually.
    - In many cases the MSc Project is more specifically focused on a selected, specific problem, whereas the MSc Thesis allows for a broader and more comprehensive evaluation of a scientific or engineering problem.

- Is there money available for the MSc Project?
    - Students are not paid for their work in the MSc Project.
    - There may be some limited funds available from the practice partner or from the responsible professor to support for example laboratory expenses. The required resources and availability of funds must be agreed upon in writing before starting an MSc Project.

5 Recommendations for students when formulating their own question or approaching practice partners

The MSc Project is an excellent opportunity for you to define your own specific research approach based on a question that you have developed yourself or that comes from a practice partner or research topic. Much of your BSc and MSc education the problems you had to solve were narrowly defined and the challenge was mostly in finding the correct solution. The MSc Project is much more open ended.

Enclosed is the detailed description of the MSc Project. Here are some additional aspects to consider when identifying your own question or approaching a practice partner:

- Working with a practice partner is an excellent opportunity to get to know the real world outside of ETH. Practice partners can provide initial ideas or questions for a project. It is your responsibility to translate these into specific and solvable research questions and approaches.

- Act professionally when you discuss a potential project idea with a practice partner. You can expect that answering a problem from practice will require you do so some independent studying. But you should also be aware of your limitations. You should critically evaluate and discuss with the practice partner (and ultimately your professor) what is feasible within the allocated amount of time, equipment, and other resources provided.
- The MSc project is an excellent way to get to know people in practice. Maybe you end up getting to know your future employer this way.

The goal of the MSc Project is that students take much more responsibility than they are used from most of their previous studies. But if students have questions or concerns they are very welcome to discuss with professors from the Environmental Engineering program.

6 Checklist

To do	Completed
Student team has identified the responsible professor.	☐
Professor agrees to suggested topic.	☐
Direct supervisor agrees to support the student team.	☐
Workplace has been agreed upon (e.g., at industry partner, at ETH, elsewhere)	☐
Practice partner acknowledges that results from the MSc Project will be open to the public (as required by ETH rules) and that the final report for the MS Project is the uncorrected result of the student project that may still contain errors and that does not constitute an endorsement by ETH.	☐
Availability of all necessary resources has been discussed and agreed upon: - Experimental facilities - Capability to analyze samples - Computational facilities - Software - Data	☐
Financial resources required for the completion of the project have been discussed and agreed upon	☐
Professor, direct supervisor and/or industry partner, and students understand and agree on the amount of effort invested (300 – 360 hours per student for the overall MSc Project) and overall period (14 weeks).	☐
Dates, times, and locations for intermediate meetings and final presentation have been agreed upon and fixed with students, direct supervisor or practice partner, and professor.	☐
Person doing the detailed reading and evaluation of the final report has been agreed upon. This person should provide also a recommendation for the grading of the final report. The final decision on the grade is taken by the professor.	☐

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