

Guidance for MSc Projects in Environmental 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 Thesis¹.

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 From the Study Guide

The following describes the formal requirements of the MSc Project in the Study Guide: *"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, 12 CP). The MSc project must be linked to the major or one of the elective modules. The supervisor for the 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."*

3 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 section 2). Students should start early to get feedback and guidance from the professor.

¹ 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>

- 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.

4 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.
- 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.² 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.³
- 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

² See also the "Guidance for BSc and MSc Theses and Projects in Environmental Engineering" available at <https://www.baug.ethz.ch/studium/umweltung/dokumente.html> regarding grading.

³ 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.

- 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.
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5 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.
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6 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. For 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 to do 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)
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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 to 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.

7 Checklist

To do	Completed
Student team has identified the responsible professor.	<input type="checkbox"/>
Professor agrees to suggested topic.	<input type="checkbox"/>
Direct supervisor agrees to support the student team.	<input type="checkbox"/>
Workplace has been agreed upon (e.g., at industry partner, at ETH, or elsewhere)	<input type="checkbox"/>
Practice partner acknowledges that all the data has to be published and results from the MSc Project will ultimately be open to the public. Any agreements on confidentiality have to be done in writing.	<input type="checkbox"/>
The final report for the MSc Project is the uncorrected result of the student project that may still contain errors and that does not constitute an endorsement by ETH.	<input type="checkbox"/>
Availability of all necessary resources has been discussed and agreed upon: <ul style="list-style-type: none"> - Experimental facilities - Capability to analyse samples - Computational facilities - Software - Data 	<input type="checkbox"/>
Financial resources required for the completion of the project have been discussed and agreed upon	<input type="checkbox"/>
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).	<input type="checkbox"/>
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.	<input type="checkbox"/>
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.	<input type="checkbox"/>
A document describing the topic of the MSc Project and summarizing the above topics has been completed and signed by student, direct supervisor, and professor.	<input type="checkbox"/>