

ENV-504

**Groundwater and soil remediation**

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<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Energy Management and Sustainability	MA2, MA4	Opt.
Environmental Sciences and Engineering	MA2, MA4	Opt.

Language of teaching	English
Credits	4
Session	Summer
Semester	Spring
Exam	Oral
Workload	120h
Weeks	14
<b>Hours</b>	<b>3 weekly</b>
Courses	2 weekly
Project	1 weekly
<b>Number of positions</b>	

**Summary**

This course covers the essential knowledge of contaminant partitioning and techniques to monitor chemical species, physical extent of contamination and biological processes. In the second part, remediation approaches are tackled. This course represents the fundamentals of remediation.

**Content**

Fundamental contaminant partitioning principles  
 Microbial processes and their quantification  
 Advanced monitoring techniques for contaminated sites  
 Physical, chemical and biological approaches to remediation

**Keywords**

partitioning  
 microbial processes  
 bioremediation  
 physico-chemical processes

**Learning Prerequisites****Recommended courses**

General Chemistry  
 General Biology  
 Microbiology for engineers  
 Soil science

**Important concepts to start the course**

Fundamentals of soil science, porosity, bulk density  
 Major biological processes, sulfate reduction, denitrification  
 Partitioning of contaminants between phases  
 Groundwater flow

**Learning Outcomes**

By the end of the course, the student must be able to:

- Synthesize information about a contaminated site
- Design a remediation approach appropriate for a given site

### Transversal skills

- Use a work methodology appropriate to the task.

### Teaching methods

Lectures, homework and a project (written report and oral presentation)

### Expected student activities

The students are expected to attend the lecture, to work on the homeworks and be ready to ask questions during the homework session.

The project entails proposing an appropriate remediation approach for a given site, writing a report and presenting the project in an oral presentation.

### Assessment methods

The written test is 50% and the oral presentation is 20% and the report is 30%. Which means that the project represents 50% (oral presentation and report).

### Supervision

Office hours	No
Assistants	No
Forum	No

### Resources

#### Bibliography

Reading assignments available on Moodle

#### Ressources en bibliothèque

- [Practical handbook of material flow analysis / Brunner, 2004](#)

#### Références suggérées par la bibliothèque

- [Handbook of material flow analysis / Brunner, 2nd ed., 2017](#)
- [Metabolism of the anthroposphere : analysis, evaluation, design / Baccini, Brunner, 2nd ed., 2012](#)

#### Notes/Handbook

Course notes available at the bookstore.

#### Moodle Link

- <http://moodle.epfl.ch/course/view.php?id=7931>

### Prerequisite for

Specialization in Environmental chemistry and processes