ENV-504 **Groundwater and soil remediation**

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Cursus	Sem.	Type
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	Written
Workload	120h
Weeks	14
Hours	**3 weekly**
Courses	2 weekly
Project	1 weekly
Number of positions	

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%. It will take place in August.
Report: 50%

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

- Metabolism of the anthroposphere : analysis, evaluation, design / Baccini, Brunner, 2nd ed., 2012
- Handbook of material flow analysis / Brunner, 2nd ed., 2017
- Practical environmental bioremediation / Barry, King, Sheldon
- An introduction to geophysical exploration / Kearey
- Hazardous waste management / LaGrega
- Bioremediation / Crawford
- Natural and enhanced remediation systems / Suthersan

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