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**
50% written test (120 min) during the semester; 50% oral exam during the exam session and written report (project)

**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**

**Prerequisite for**
Specialization in Environmental chemistry and processes