Applied Environmental Biogeochemistry

Synopsis

The topics covered will allow getting knowledge in main aspects of biogeochemistry and dynamics of contaminants in natural matrices.

Aims

To provide exposure to the processes (chemical, physical, geological, biological) and reactions that govern the composition of the natural environment (water, soil, atmosphere, biota).

Objectives

At the end of the course, you should:

1. Understand the main physic-chemical processes in soil-water-rock and their interface.

2. Understand the principles of contaminant transport and distribution in soil, water and atmospheric environmental systems.

3. Understand the current processes governing contaminant behavior in different matrices.

4. Understand the main elements of a monitoring programme, and critically evaluate whether a monitoring design adequately addresses the environmental objectives of the study.

5. Identify the main biogeochemical cycles.

6. Comprise the bases of contamination/pollution transport modelling.

Syllabus

1. Chemical constitution and formation processes of soil and water environmental systems

2. The solid-liquid interface. Adsorption and ion exchange processes in natural systems

3. Chemical processes in terrestrial environmental systems (acid-base, redox)

4. Behaviour and fate of pollutants in natural systems

5. Monitoring programme: the 6W

6. Water Dynamics in natural environments

7. Water-rock relations in the groundwater environment

8. Sediments as a vector of contaminants

9. Atmospheric pollution processes

10. Contamination modelling

Learning & Teaching

•Lectures: 20 hr

•Seminars (for case studies and applications): 5 hr

•**Laboratory (and/or Field) work :** 15 hr

Semester: 1

Timetable slot: To be advised

ECTS: 4

Level: Optional

Bibliography

- Schlesinger, W.H., Bernhardt, E. 2013. Biogeochemistry: An analysis of Global Change (3rd Edition). Academic Press. ISBN: 9780123858740
- Likens, G.E. 2010. Biogeochemistry of inland waters. Academic Press. ISBN: 9780123819970
- Prasad, M.N.V., Sajwan, K.S., Naidu, R. 2019. Trace elements in the environment. CRC Press. ISBN 9780367391966
- Fetter, C.W. 2001. Applied Hydrogeology. 4th ed. Upper Saddle River, NJ: Prentice Hall.

Assessment

- Questionnaire: 25%
- Poster presentation: 45%
- Work related to the field trip(s): 30%

Course Evaluation

By completion of University Unit Evaluation Questionnaire by students.