

## Metals and Metalloids in Environment and Technology (I003016)

**Course size** *(nominal values; actual values may depend on programme)*

**Credits 5.0**

**Study time 150 h**

**Course offerings in academic year 2024-2025**

A (semester 1)

English

Gent

**Lecturers in academic year 2024-2025**

Tack, Filip

LA24

lecturer-in-charge

De Schamphelaere, Karel

LA22

co-lecturer

Du Laing, Gijs

LA24

co-lecturer

Meers, Erik

LA24

co-lecturer

**Offered in the following programmes in 2024-2025**

**crdts**

**offering**

[International Master of Science in Sustainable and Innovative Natural Resource Management](#)

5

A

[Master of Science in Bioscience Engineering: Environmental Technology](#)

5

A

[Master of Science in Environmental Science and Technology](#)

5

A

[Exchange Programme in Bioscience Engineering: Chemistry and Bioprocess Technology \(master's level\)](#)

5

A

[Exchange Programme in Bioscience Engineering: Environmental Technology \(master's level\)](#)

5

A

**Teaching languages**

English

**Keywords**

Metals, trace elements, metalloids, environmental chemistry, soil, water, remediation, bioavailability, ecotoxicity, risk assessment

**Position of the course**

This is a specializing course focusing on the occurrence, geochemical behaviour, human uses and related environmental issues of metals and metalloids in environment and technology.

**Contents**

1. Heavy metals and metalloids: environmental chemistry, general principles and processes
2. Ecotoxicology, bioavailability and risk assessment of metals and metalloids in the environment
3. Physicochemical remediation techniques for metal-polluted water, sediments and soil
4. In situ management of heavy metals and metalloids in floodplains and river sediments
5. Phytomanagement
6. Environmental effects of mining activities and sustainable management of metal resources

**Initial competences**

- 1 Knowledge of general chemistry and analytical chemistry
- 2 Basic knowledge of environmental aquatic science
- 3 Basic knowledge of soil science

**Final competences**

- 1 Explain the nature and importance of metals and metalloids in environment and society
- 2 Explain chemical forms of occurrence and importance on the physico-chemical behaviour and ecotoxicity of metals and metalloids in the environment
- 3 Understand the meaning of background concentrations and the reasoning behind derivation of legal environmental standards
- 4 Depict interactions between metals and plants and the active role of plants in establishing

homeostasis

- 5 Understand mechanisms determining bioavailability and ecotoxicity of metals and compute bioavailability based environmental risk and environmental criteria
- 6 Select and apply suitable remediation and containment approaches for metal contaminated soils, sediments and water
- 7 Have insight in the potential negative effects of high concentrations of metals and metalloids on the environment and on humans

#### **Conditions for credit contract**

Access to this course unit via a credit contract is determined after successful competences assessment

#### **Conditions for exam contract**

This course unit cannot be taken via an exam contract

#### **Teaching methods**

Group work, Lecture, Practical, Peer teaching

#### **Extra information on the teaching methods**

Lecture: Lecture also includes guest lecturers from outside speakers (about 4 hrs).

Group Work and peer teaching: Students prepare a case related to phytoremediation and present it to the group.

Practical: Transfer of contamination from soil to plant is experimentally assessed by small groups of students. Soil and plant samples are collected on the field and analysed in the lab.

The data are evaluated and discussed in a report of about 10 pages.

#### **Study material**

Type: Slides

Name: Slides

Indicative price: Free or paid by faculty

Optional: no

Type: Handouts

Name: Handouts

Indicative price: Free or paid by faculty

Optional: no

Type: Lab Material

Name: Alcohol Felt Tip Pen

Indicative price: € 10

Optional: no

#### **References**

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#### **Course content-related study coaching**

Professors and staff members of the department are available (upon appointment).

#### **Assessment moments**

end-of-term and continuous assessment

#### **Examination methods in case of periodic assessment during the first examination period**

Written assessment with open-ended questions

#### **Examination methods in case of periodic assessment during the second examination period**

Written assessment with open-ended questions

#### **Examination methods in case of permanent assessment**

Peer and/or self assessment, Assignment

#### **Possibilities of retake in case of permanent assessment**

examination during the second examination period is possible in modified form

#### **Extra information on the examination methods**

Continuous assessment:

Group work and peer teaching: evaluation based on papers, presentation and discussion.

Practical: evaluation based on report of laboratory activities

#### **Calculation of the examination mark**

Continuous assessment: 5/20

End-of-term assessment: 15/20

Students who eschew continuous assessment may be failed by the examiner. In this case, a score of at most 9/20 will be assigned.