

## Metals and Metalloids in Environment and Technology (I002749)

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

**Credits 6.0**      **Study time 180 h**      **Contact hrs**      60.0h

**Course offerings and teaching methods in academic year 2022-2023**

A (semester 1)	English	Gent	lecture	31.25h
			practicum	25.0h
			group work	1.25h
			microteaching	2.5h

**Lecturers in academic year 2022-2023**

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 2022-2023**

	crdts	offering
<a href="#">International Master of Science in Sustainable and Innovative Natural Resource Management</a>	6	A
<a href="#">Master of Science in Bioscience Engineering: Environmental Technology</a>	6	A
<a href="#">Master of Science in Environmental Science and Technology</a>	6	A
<a href="#">Exchange Programme in Bioscience Engineering: Chemistry and Bioprocess Technology (master's level)</a>	6	A
<a href="#">Exchange Programme in Bioscience Engineering: Environmental Technology (master's level)</a>	6	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. Assessment of baseline concentrations in soils – legislation
3. Soil-plant relationship
4. Ecotoxicology, bioavailability and risk assessment of metals and metalloids in the environment
4. Physicochemical remediation techniques for metal-polluted water, sediments and soil
5. In situ management of heavy metals and metalloids in floodplains and river sediments
6. Phytomanagement
7. 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**

Practicum, Group work, Microteaching, Lecture

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

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

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

Practicum: Students in small groups independently perform a plant pot experiment, collect the data, interpret the results and report.

#### **Learning materials and price**

Elaborated slides and selected scientific publications as background reading, made available through the electronic learning platform.

#### **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 examination with open questions

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

Written examination with open questions

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

Report, Peer assessment, Assignment

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

examination during the second examination period is possible in modified form

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

Permanente evaluatie: 5/20

Periodegebonden evaluatie: 15/20

Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.