GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2024-2025

Environmental Technology: Soil and Sediment (I002589)

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

Credits 3.0 **Study time 90 h**

Course offerings and teaching methods in academic year 2024-2025

A (semester 2)	English	Gent	lecture seminar group work
B (semester 1)	English	Gent	group work seminar lecture

Lecturers in academic year 2024-2025

Tack, Filip	LA24	lecturer-in-charge
Cornelis, Wim	LA20	co-lecturer

Offered in the following programmes in 2024-2025	**crdts**	**offering**
International Master of Science in Agro- and Environmental Nematology	3	A
International Master of Science in Environmental Technology and Engineering	5	B
Master of Science in Environmental Science and Technology	3	A
Exchange Programme in Bioscience Engineering: Environmental Technology (master's level)	5	A, B
Exchange Programme in Bioscience Engineering: Land and Forest management (master's level)	3	A

Teaching languages

English

Keywords

soil; sediment; contamination; organic contaminants; inorganic contaminants; trace elements; heavy metals; water and chemical transport in soil

Position of the course

This master course focusses on approaches and technologies for the management of contaminated land, and the remediation of contaminated soils and sediments. There is also a partim that deals specifically with the transport of water and chemicals in the soil.
This course is offered in 2 sessions. In Partim I, Session A (3 ECTS) immediately focusses on the more specific apects, and thus requires students to have a certain background in environmental chemistry and soil science. Session B (5 ECTS) includes a basis on soil properties and soil pollutants and behaviour. In part II, the same topics are covered in both sessions. However, session A, unlike session B, will not go into the measurement methods to determine hydrophysical soil properties and state variables that are discussed in the four chapters.

Contents

Partim I. Soil and Sediment Remediation Technology
-- Session A and B --
1. Introduction
2. An overview of treatment technologies
-- Session B only --
3. Soil properties and composition

4. Chemical soil pollutants
5. Soil, groundwater and subsurface contamination
6. Site characterization and sampling strategy
-- Session A and B --
7. Biological treatment techniques
8. Physical and chemical treatment techniques
9. Solidification and stabilization
10. Thermal soil remediation techniques
11. Sediment management and treatment

Partim II. Water and chemical transport in soil and sediment
1. Soil solid phase: composite properties of soil and sediment
2. Water retention in soil and sediment
3. Water movement in soil and sediment
4. Chemical transport in soil and sediment

Initial competences

--Session A--
General physics, general chemistry and organic chemistry, environmental chemistry and soil science
--Session B --
General physics, general chemistry and organic chemistry

Final competences

1 Understand and conceptually explain approaches and technologies applied for the management of contaminated land and remediation of contaminated soils and sediments.
2 Identify possibilities and limitations associated with different conceptual approaches for management of contaminated land and remediation of contaminated soil and sediments
3 Draw, in general terms, a proposal for remediation of a specific site.
4 Have a good understanding of water and chemical transport.
5 Have a good understanding of basic methods of hydrophysical soil analysis (session B)

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, Seminar, Lecture

Extra information on the teaching methods

Group work and seminar: students work out a soil remediation case and present this to all students for discussion during a seminar
Online lecture: short video's in preparation of on campus seminars
Seminar: coached exercises: simple calculations are solved classically; model simulations with Hydrus model

Study material

Type: Syllabus

Name: Environmental Technology: Soil and Sediment: Partim II. Water and chemical transport in soil and sediment
Indicative price: € 10
Optional: no

Type: Syllabus

Name: Environmental Technology: Soil and Sediment
Indicative price: € 25
Optional: no

Type: Slides

Name: Slides
Indicative price: Free or paid by faculty
Optional: no

References

Ok, Y.S., Rinklebe, J., Hou, D., Tsang, D., Tack, F.M.G., Rinklebe, J., Hou, D., Tsang, D., Tack, F.M.G., 2020. Soil and Groundwater Remediation Technologies: A Practical Guide. CRC Press. https://doi.org/10.1201/9780429322563
Jury, W.A. & Horton, R. 2004. Soil Physics. John Wiley & Sons

Course content-related study coaching

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 not possible

Extra information on the examination methods

Continuous assessment: evaluation based on report, papers, presentation and discussion.
End-of-term assessment: written examination with open questions

Calculation of the examination mark

Session A (3 ECTS, 2nd semester)
Partim I. Soil and Sediment Remediation Technology: 2/3 of total of which 60% continuous assessment
Partim II. Water and chemical transport in soil and sediment: 1/3 of total of which 35% continuous assessment
Session B (5 ECTS, 1st semester)
Partim I. Soil and Sediment Remediation Technology: 3/5 of total of which 40% continuous assessment
Partim II. Water and chemical transport in soil and sediment: 2/5 of total of which 35% continuous assessment
Students who eschew continuous assessment may be failed by the examiner. In this case, a score of at most 9/20 will be assigned.
When on one of the partims a score less than 8/20 is obtained, the student may be failed for the entire course. In this case, a score of at most 9/20 will be assigned.