GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2025-2026

Soil Biology (I002992)

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

Credits 4.0 **Study time 120 h**

Course offerings in academic year 2025-2026

A (semester 1)	English	Gent

Lecturers in academic year 2025-2026

De Neve, Stefaan	LA20	lecturer-in-charge
Hu, Junwei	LA20	co-lecturer

Offered in the following programmes in 2025-2026	crdts	offering
International Master of Science in Soils and Global Change (main subject Soil Ecosystem Services and Global Change)	4	A
International Master of Science in Soils and Global Change (main subject Soil-Plant System Processes and Global Change)	4	A
Master of Science in Bioscience Engineering: Agricultural Sciences	4	A
Master of Science in Bioscience Engineering: Forest and Nature Management	4	A
Master of Science in Bioscience Engineering: Land, Water and Climate	4	A
Exchange Programme in Bioscience Engineering: Agricultural Sciences (master's level)	4	A
Exchange Programme in Bioscience Engineering: Land and Forest management (master's level)	4	A

Teaching languages

English

Keywords

Soil organisms – soil biodiversity - ecological roles – plant soil biota interactions – soil health

Position of the course

Soil is far more than a mixture of solid, liquid, and gaseous components—it is a dynamic ecosystem teeming with immense biodiversity. Soil organisms play a crucial role in a wide range of soil processes and provide essential ecosystem services that are fundamental to both agricultural productivity and environmental sustainability. In recent years, soil biodiversity has gained increasing attention in global research and policy discussions. This course provides in-depth knowledge of the diverse array of soil organisms—from viruses, bacteria, fungi, and protists to multicellular fauna—and the methods used to analyze them. It explores the interactions among these organisms and with their abiotic environment, as well as their roles in key soil processes such as soil structure formation, nutrient cycling, carbon sequestration, climate regulation, disease suppression, and plant productivity. Through case studies, students will learn experimental techniques used to investigate the role of soil biota in critical soil functions. Ultimately, the course introduces students to how soil biology knowledge can be applied to support soil health and planetary sustainability.

Contents

Theory
1. Introduction: soil biodiversity and soil health
2. The soil as habitat
3. Soil prokaryotes: bacteria and archaea
4. Soil fungi
5. Soil protists

6. Soil fauna
7. Soil enzymes
8. Soil viruses
9. Analysis of life in soil
10. Trophic and non-trophic interactions
11. The functions of soil biota: experimental methodology and case studies
12. Biological soil health indicators
13. Soil ecological engineering

Practical

1. Sampling for soil biological analyses
2. Litter decomposition experiment and modeling
3 Soil fauna (earthworms, mesofauna, and nematodes) extraction and counting
4 Microbial biomass and enzyme activity analysis
5. Soil food web modeling

Initial competences

This course builds on the final competences from the course Soil Science, or these final competences have been acquired in a different manner

Final competences

1 Understand the complexity of soil habitats, and the ecological classification and spatial distribution of soil biota.
2 Comprehend the interactions among soil organisms and their environment, as well as their roles in soil processes.
3 Know appropriate methods for analyzing the abundance, community composition, and activity of different soil organisms.
4 Be familiar with experimental techniques for studying functional roles of soil organisms.
5 Know the application of soil biology knowledge in practices that support sustainable agriculture and environmental management.

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

Lecture, Practical

Study material

Type: Handouts

Name: Lecture notes and manual for practicals
Indicative price: Free or paid by faculty
Optional: no
Additional information: Lecture notes and manual for practicals will be made available. The slides of the lectures and additional materials will be made available through the electronic learning platform.

References

Soil microbiology, ecology and biochemistry. 2015. Paul EA (Ed.), Academic Press Elsevier, 582 pp.
Global Soil Biodiversity Atlas. 2016. JRC: https://esdac.jrc.ec.europa.eu/content/global-soilbiodiversity-atlas

Course content-related study coaching

Students can always ask questions to the lecturer and the assistant. Additional background information will be made available through the electronic learning platform

Assessment moments

end-of-term and continuous assessment

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

Written assessment with multiple-choice questions, Written assessment with open-ended questions

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

Written assessment with multiple-choice questions, Written assessment with open-ended questions

Examination methods in case of permanent assessment

Oral assessment, Presentation

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Calculation of the examination mark

The non-period aligned evaluation (presentation and oral assessment of field and lab activities) counts for 40% of the total score. The period aligned evaluation (written assessment with multiple choice and open-ended questions) counts for 60% of the total score. If a student mathematically passes the course, but has eschewed period or non-period aligned evaluations, the examinator may fail him/her. He/She will then be assigned a score of 9/20.