GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2026-2027

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 2027-2028

A (semester 1)	English	Gent

Lecturers in academic year 2027-2028

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

Offered in the following programmes in 2027-2028	**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: 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: Ecosystem Management (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 and living ecosystem that contains a remarkable diversity of organisms. These organisms play essential roles in a wide range of soil processes and provide critical 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 introduces students to the main groups of soil biota, including viruses, prokaryotes, fungi, protists, and soil fauna, and outlines their key morphological, physiological, and behavioral characteristics. The course emphasizes the interactions among these organisms and between soil biota and their physical and chemical environment. It examines their contributions to soil structure formation, nutrient cycling, carbon transformation, climate regulation, disease suppression, and plant productivity.
Through case studies and practical activities, students will learn how to analyze soil organisms using various techniques and how to investigate their functional roles through observational, experimental, and modeling approaches. By the end of the course, students will understand how soil biological knowledge can be applied to promote soil health, agricultural productivity, and environmental sustainability.

Contents

Theory
1. Introduction: soil biodiversity and soil health
2. The soil as a habitat

3. Soil prokaryotes: bacteria and archaea
4. Soil fungi
5. Soil fauna
6. Soil protists
7. Soil viruses
8. Soil enzymes
9. Analysis of life in soil
10. Ecological interactions in soil ecosystems
11. Studying the functions of soil biota: methodology and case studies
12. Biological soil health indicators
13. Managing soil biota and their functions
Practical
1. Sampling for soil biological analyses
2. Litter decomposition experiment and modeling
3 Soil fauna (earthworms, microarthropods, 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 temporal and spatial distribution of soil biota shaped by habitat conditions.
2 Describe the basic morphological, physiological, and behavioral characteristics of common soil biota groups.
3 Explain the interactions among soil organisms and their environment within soil ecosystems, as well as their roles in ecosystem functioning.
4 Select, justify, and apply appropriate methods for quantifying the abundance, diversity, community composition, and activity of soil biota.
5 Design observational, experimental, and modeling studies to investigate and interpret the functional roles of soil biota.
6 Integrate soil biological knowledge to develop and evaluate strategies 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, Peer teaching

Study material

Type: Slides

Name: Slides and Practical Manuals
Indicative price: Free or paid by faculty
Optional: no
Language : English
Available on Ufora : Yes
Additional information: Lecture notes will also be made available as supplementary learning materials through Ufora.

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.