

Soil Biology (1002992)

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

Credits 4.0

Study time 120 h

Course offerings in academic year 2024-2025

A (semester 1)

English

Gent

Lecturers in academic year 2024-2025

De Neve, Stefaan

LA20

lecturer-in-charge

Hu, Junwei

LA20

co-lecturer

Offered in the following programmes in 2024-2025

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

Teaching languages

English

Keywords

Soil organisms – (functional) soil biodiversity – soil ecology – trophic interactions – spatial distribution – plant soil biota interactions

Position of the course

Soil biodiversity is currently very high on the international research and policy agenda. In this course, we study the enormous diversity of soil organisms (from bacteria over protozoa to multicellular organisms), the interactions between these organisms and with the plant, and how they control crucial processes in the soil. The role of soil organisms for a number of soil functions, such as nutrient retention and release, soil structure creation, regulation of greenhouse gas emissions, disease suppressiveness of a soil, are studied in detail in the form of case studies. The emphasis is on the most important but also scientifically most challenging organisms, in particular bacteria and fungi, protozoa and nematodes. Depending on the specific interests of students (e.g. within the framework of MSc thesis research or a PhD), additional topics can be touched upon or treated more extensively.

Contents

Theory

1. The soil as habitat
2. Classification and ecology of soil organisms
3. Soil prokaryotes: bacteria and archaea
4. Soil fungi
5. Soil fauna
6. Soil enzymes
7. Spatial distribution of soil organisms
8. Analysis of life in soil

9. The soil foodweb

10. Experimental methods in soil biology

Case studies

- The role of micro and mesofauna in nutrient release and retention
- Interplay between plants and soil organisms
- Disease suppressiveness of soils

Practicals

The practical exercises include extraction, determination of biomass and identification of a number of groups of soil organisms, and the use of proxies for measuring activities and diversity of soil organisms (e.g. soil enzyme activities, molecular techniques). These exercises will be applied in a number of existing or new experiments that clearly illustrate the impact of soil management on soil organisms

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 To know the ecological classification of soil organisms and their phylogenetic position
- 2 Understand the spatial distribution of soil organisms and its implications for interactions between organisms and for soil functions
- 3 Know appropriate methods for extraction and quantification of specific groups of soil organisms
- 4 Know appropriate methods for measuring the activity of soil organisms
- 5 Understand how soil organisms determine crucial soil functions

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

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

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

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible in modified form

Calculation of the examination mark

The practicals (reports of the lab activities) count for one third of the total score.

The theoretical

exam counts for two thirds of the total score. Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.