

Biochemical Processes in the Rhizosphere (I002898)

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

Credits 3.0 **Study time 90 h** **Contact hrs** 30.0h

Course offerings in academic year 2022-2023

A (semester 1) English Gent

Lecturers in academic year 2022-2023

Blagodatskaya, Evgenia GOTTIN01 lecturer-in-charge
Dorodnikov, Maxim GOTTIN01 co-lecturer

Offered in the following programmes in 2022-2023

	crdts	offering
International Master of Science in Soils and Global Change (main subject Soil Biogeochemistry and Global Change)	3	A

Teaching languages

English

Keywords

Position of the course

Contents

Contents:

The Rhizosphere: introduction, definitions and seminar topics overview

- C-balance between leaves and root; Root hairs; Nutrient mobilization in the rhizosphere; Rhizodeposition & Global Change; Mycorrhiza.

Microbial ecology in the rhizosphere

- Definitions and scales of interactions
- Rhizosphere gradients
- The rhizosphere microbial community
- Principles of Microbial Ecology in the rhizosphere

Rhizodeposits and root exudates

- Substrate sources in the Rhizosphere
- Interactions in the rhizosphere induced by rhizodeposition: positive
– negative direct and indirect interactions

Application of modern ecological concepts to the rhizosphere study

- A home-field advantage
- Microbial loop
- Food webs
- Active and dormant microorganisms
- Hotspots and hot moments

Plant-mediated nutrient acquisition from SOM

- Rhizosphere priming effect
- Role of complexation & chelation reactions in nutrients mobilization in the rhizosphere
- Metal bridges concept
- Organic N uptake by Plant

The rhizosphere under global change

- Effects of elevated CO₂ on below ground processes
- Role of mucilage in extreme drought mitigation
- Rhizosphere microbial community under fluctuating freezing-thawing

Visualization of the rhizosphere processes

- Planar optodes

- Laser scanning & X-ray microtomography
- 2D and 3D zymography
- Link the process localization with their rates: kinetic approaches in the rhizosphere

Initial competences

Basic soil science and biochemistry knowledge

Final competences

The course is aimed to extend a basic knowledge on general features and peculiarities of the rhizosphere in natural and agroecosystems to the specific rhizosphere processes and components; rhizosphere interactions with soil, other plants, animals, microorganisms; fluxes of elements; effect of Global Change on rhizosphere processes and mitigation strategies.

The course focuses on facilitation of the student's interests to ecological studies and on motivation of the students for creative application of knowledge on environmental processes to understand, explain and predict rhizosphere processes.

Conditions for credit contract

This course unit cannot be taken via a credit contract

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Seminar, Lecture

Learning materials and price

References

Course content-related study coaching

Assessment moments

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

Written examination, Oral examination

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

Written examination, Oral examination

Examination methods in case of permanent assessment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Calculation of the examination mark