Course Specifications
Valid as from the academic year 2017-2018

Microbial Ecological Processes (I000579)

Course

Credits  5.0
Study time  135 h
Contact hrs  60.0 h

Course offerings and teaching methods in academic year 2017-2018

A (semester 1)
Dutch

Lecturers in academic year 2017-2018

Boon, Nico
LA25 lecturer-in-charge

De Vrieze, Jo
LA25 co-lecturer

Offered in the following programmes in 2017-2018

Bachelor of Science in Bioscience Engineering (main subject Cell and Gene Biotechnology) 5  A
Master of Science in Bioscience Engineering: Forest and Nature Management 5  A
Master of Science in Bioscience Engineering: Land and Water Management 5  A

Teaching languages
Dutch

Keywords
Microbial ecology, microbial diversity, soil microbiology, microbiology of the higher organisms, nutrient cycles

Position of the course
The centre of this course is the interrelation between microbial associations with water, soil, air, plant and human/animal. These relations are discussed from an engineering point of view.
In part A characteristics of the microbial communities are discussed. Basic phenomena such as the dispersion of propagules and the importance of surface structures in attachment and biofilm formation of micro-organisms are addressed.
Part B discusses the main processes occurring in the soil and in the plant-rhizosphere. Attention is also directed towards methods for the stimulation of micro-organisms towards conversion of minerals and organic compounds in nature. Part C addresses the microbial associations that stand in a direct relation with humans and animals, specific attention goes to the colonisation of the host.
Practical exercises are directed towards the use of computer models describing microbial associations and their mode of operation.

Contents

Theory

Part A : Characteristics of microbial communities
I. Microbiota : functional overview
II. Basic phenomena in relation to microbial ecology

Part B : Soil and plant microbial processes
I. Aerobic mineralisation in sediment soils
II. Soil as an ecosystem

(Approved)
III. Interrelations plant - microbiota
IV. Energy balance of the ecosystem
V. The carbon cycle
VI. The nitrogen cycle
VII. Soil sterilization and hygienization
VIII. Soil treatment for organic pollutants

Part C : Colonisation of higher organisms
I. Microbial associations
II. Function of the intestinal microbiota

Practical exercises

Computer practicum: simulation of microbial transport phenomena and degradation processes
Lab practicum: checking basic phenomena such as respiration and nitrification on the basis of practical experimentation

Initial competences
Microbial Ecological Processes builds on certain learning outcomes of course units Microbiology, Biochemistry and Molecular Biology, Ecology, Organic Chemistry and Inorganic Chemistry; or the learning outcomes have been achieved differently.

Final competences
1 Applying modern techniques for the analysis and control of microbial communities and their activities in open systems.
2 Calculating efficiencies of microbial processes.
3 Estimating the impact of micro-organisms on the nitrogen and carbon cycle.
4 Determining and quantifying interactions between plants and micro-organisms.
5 Explaining and applying basic phenomena in the field of microbial ecology in microbial processes.
6 Understanding and applying of interactions between micro-organisms and the host (the human body).

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
Guided self-study, group work, lecture, practicum, seminar: practical PC room classes

Learning materials and price
Course notes will be provided by the VLK

References

Course content-related study coaching
Study coaching is being offered during the exercises and after theory colleges.

Evaluation methods
end-of-term evaluation and continuous assessment

Examination methods in case of periodic evaluation during the first examination period
Written examination with open questions, written examination, open book examination, oral examination

Examination methods in case of periodic evaluation during the second examination period
Written examination with open questions, written examination, open book examination, oral examination

Examination methods in case of permanent evaluation
Assignment, report

(Approved)
Possibilities of retake in case of permanent evaluation
examination during the second examination period is not possible

Extra information on the examination methods
The oral exam comprises questions related to the theoretical and practical knowledge in the course notes. The written exam contains exercises in which the theoretical principles in the course notes will be applied. The workpiece comprises a critical evaluation of a research paper. The report should be written in the framework of the practical exercises.

Calculation of the examination mark
Oral + written exam : ca. 50%
Workpiece : ca. 25%
Practicals: ca. 25%
Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.