Course Specifications
Valid as from the academic year 2019-2020

Microbial Ecological Processes (I002505)

Course

Course size
Credits 4.0
Study time 120 h
Contact hrs 40.0 h

Course offerings and teaching methods in academic year 2019-2020
A (semester 1) Dutch
lecture 30.0 h
seminar: practical PC room classes 7.5 h
guided self-study 1.25 h
group work 1.25 h

Lecturers in academic year 2019-2020
Boon, Nico LA25 lecturer-in-charge
De Vrieze, Jo LA25 co-lecturer

Offered in the following programmes in 2019-2020
Bachelor of Science in Bioscience Engineering (main subject Cell and Gene Biotechnology) 4 A
Bachelor of Science in Bioscience Engineering (main subject Environmental Technology) 4 A
Master of Science in Bioscience Engineering: Land and Water Management 4 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.
PC 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
III. Interrelations plant - microbiota

(Approved)
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

**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.
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, seminar: practical PC room classes.

**Learning materials and price**

Course notes will be provided by the VLK.

**References**

Environmental Microbiology. (Maier et al., Eds.). Academic Press. 585 p. ISBN 0-12-
497570-4.

**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.

**Possibilities of retake in case of permanent evaluation**

examination during the second examination period is not possible.

**Extra information on the examination methods**

(Approved)
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.

Calculation of the examination mark

Oral + written exam : ca. 65%
Workpiece : ca. 35%

Students who eschew period aligned and/or non-period aligned evaluations for this course unit may be failed by the examiner.