

# QBio401: Microbial Ecology

**Module Responsible:**  
Prof. Dr. Bart Thomma

**Version:**  
02/01/2021

**Module Organizer:**  
Prof. Dr. Bart Thomma

**Type:**  
Compulsory

**Lecturer:**  
Prof. Dr. Bart Thomma

**Total Working Time**  
180 h

**Credit Points**  
6 CP

**Contact Time**  
75 h

**Self Study**  
105 h

**Duration**  
1 Semester

**Course Components**

Lecture: 3 SWS  
Exercise: 2 SWS

**Group Size**

P: 40  
P: 20

**Frequency**

Every Summer Semester

**Learning Competencies:**

In the Microbial Ecology course students will learn about the occurrence, diversity and activity of various types of microorganisms (archaea and bacteria, protozoa, fungi, and viruses) in various kinds of ecosystems. Furthermore, students will gain insight into the wide array of associative interactions of microorganisms that occur in symbioses with other microorganisms as well as with host organisms, and that range from mutualism through commensalism to parasitism.

After completing the module, students are able to:

- explain interactions of microorganisms with their biological and physico-chemical environment
- reproduce mechanisms for detection, identification and functional characterization of microorganisms and their roles in whole microbial communities at the DNA- and RNA-level
- explain theories on genome stability, gene fluxes and their links to adaptation
- reproduce mechanisms of quorum sensing and quorum quenching in cell-to-cell communication and cross talk between microorganisms
- understand the role of microorganisms in various types of symbiotic interactions as well as communication and cross talk between microorganisms and their hosts such as in the mammalian intestine, in plant-microbe interactions, in the soil and in aquatic biospheres

**Content:**

Microbial ecology is exploration of the diversity, the abundance and the distribution of microorganisms, and the study of the interactions of their interactions with each other, the environment, and other living organisms such as human, animal and plant species. Microorganisms form essential and influential parts of ecosystems, as they play crucial roles in various types of symbioses, but also in biogeochemical cycles and in anthropogenic phenomena such as climate change and pollution. In microbial ecology, the dynamics of microbial compositions and the effects that they have on ecosystems is addressed.

Lecture Microbial Ecology

- Biosphere
  - Ecosystems Dynamics
  - Habitats
  - Role in Ecosystem
  - Microbes and Climate
- Nutrient Cycles / Organism-Environment Interaction
  - Carbon fixation
  - Nitrogen fixation
  - Methane Metabolism
  - Sulfur Metabolism
  - Metals
  - Microbes and Pollution
- Ecosystems
  - Symbiosis
  - Microbiomes
  - Microbe-Host Interactions
    - Mutualism
    - Parasitism
      - Microbe - Animal
      - Microbe - Plant
  - Microbe-Microbe Interactions
    - Two Component System
    - Quorum Sensing/Quenching

**Conditions of Participation:**

Passed Modules QBio101 and QBio201

**Examination:**

Project Work

**Prerequisites for Awarding Credits for this Module:**

Passing Project Work

**Factor for the Overall Grade:**

The grade is weighted according to the credit points (CP) in the overall grade.

**Language:**

English

**Literature:**

**Further Information:**