Course Specifications
Valid as from the academic year 2019-2020

Course offerings and teaching methods in academic year 2019-2020
A (semester 2) English practicum 12.5 h
lecture 37.5 h

Lecturers in academic year 2019-2020
Höfte, Monica LA21 lecturer-in-charge
Defoirdt, Tom LA25 co-lecturer
Van de Wiele, Tom LA25 co-lecturer

Offered in the following programmes in 2019-2020
Bachelor of Science in Bioscience Engineering (main subject Cell
and Gene Biotechnology) 5 A

Teaching languages
English

Keywords
Gene regulation, quorum sensing, sigma factors, host-pathogen interaction

Position of the course
This course covers various mechanisms involved in gene expression and protein
production in plant-, animal-, and human-associated bacteria as well as their interaction
with the host.

Contents
1. Bacterial processes involved in the interaction with a host
1.1. Motility, chemotaxis and adhesion
1.2. Production of extracellular polysaccharides and biofilm formation
1.3. Production of lytic enzymes and toxins
1.4. Iron uptake and siderophore production
1.5. Protein secretion Type I secretion Type II secretion Type III secretion Type IV
secretion Type VI secretion
2. Regulation of gene expression in prokaryotes
2.1. Transcriptional regulation
2.2. Alternative sigma factors
2.3. Two component regulation systems
2.4. Phase variation and phenotypic switching
2.5. Signal systems (quorum sensing)
2.6. Intracellular signaling (second messengers)
2.7. Posttranscriptional regulation
3. Global regulatory networks
4. Communication between host and bacterium
4.1. Sensing of bacteria by the host
Innate immunity: physical barriers, phagocytes, NK cells, inflammation and
antimicrobial peptides Constitutive defense in plants
Adaptive immunity: humoral and cellular Inducible defense in plants
Recognition of Microbe Associated Molecular Patterns by Pathogen Recognition
Receptors
Recognition of effectors in plants
4.2. Sensing of host cues by bacteria Sensing of hormones and neurotransmitters
Sensing and manipulation of the host defense system Sensing of host metabolites
5. Antivirulence therapy: controlling bacterial infections by blocking virulence

(Accredited)
(regulatory) mechanisms

Initial competences
- Basic knowledge biochemistry, microbiology, molecular biology

Final competences
1. Understanding and applying the complex gene regulation in prokaryotic organisms.
2. Understanding and applying the importance of gene regulation in biological processes.
3. Understanding and applying the complexity of the interaction between bacteria and their host (plant, animal, human).
4. Being aware of the analogies with respect to host-microbe interactions in the different types of hosts.
5. Understanding, discussing, interpreting and evaluating scientific literature.

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, lecture, practicum, self-reliant study activities

Extra information on the teaching methods
- A report needs to be submitted for the practical exercises

Learning materials and price
- Lecture notes will be provided. Estimated cost: 15 EUR.

References

Course content-related study coaching
- Lectures and assistants are available for further explanations via Minerva, e-mail, personal contact or during exercises.

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

Examination methods in case of periodic evaluation during the second examination period
- Written examination with open questions

Examination methods in case of permanent evaluation
- Participation, assignment, report

Possibilities of retake in case of permanent evaluation
- examination during the second examination period is possible

Extra information on the examination methods
- Second examination opportunity in case of continuous assessment

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

(Approved)