GHENT UNIVERSITY

Course Specifications

Valid as from the academic year 2025-2026

Molecular Biology of Plant, Animal and Human Associated Bacteria (I003074)

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

Credits 5.0 **Study time 150 h**

Course offerings in academic year 2025-2026

A (semester 2) English Gent

Lecturers in academic year 2025-2026

Höfte, Monica	LA21	lecturer-in-charge
Defoirdt, Tom	LA25	co-lecturer

Offered in the following programmes in 2025-2026	**crdts**	**offering**
Bachelor of Science in Bioscience Engineering	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 (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

Lecture, Practical

Extra information on the teaching methods

A report needs to be submitted for the practical exercises
Students need to make a termpaper in pairs

Study material

Type: Syllabus

Name: Molecular biology of plant-, animal- and human-associated bacteria
Indicative price: € 10
Optional: no
Language : Dutch
Number of Pages : 221
Oldest Usable Edition : 2024
Available on Ufora : No
Online Available : No
Available in the Library : Yes
Available through Student Association : Yes
Additional information: Course material can be bought via the student association. Slides that accompany the course are available on UFORA

References

Wilson M, McNab R, Henderson B. 2007. Bacterial disease mechanisms. An introduction to cellular microbiology.
Cambridge University Press. ISBN 978-0-521-79689-7
Vasil ML, Darwin AJ. 2013. Regulation of bacterial virulence. ASM Press. ISBN 978-1-55581-676-6

Course content-related study coaching

Lectures and assistants are available for further explanations via the electronic learning platform, e-mail, personal contact or during exercises.

Assessment moments

end-of-term and continuous assessment

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

Written assessment with open-ended questions

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

Written assessment with open-ended questions

Examination methods in case of permanent assessment

Participation, Assignment

Possibilities of retake in case of permanent assessment

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.