GHENT UNIVERSITY

Course Specifications

From the academic year 2021-2022 up to and including the academic year

Frontiers in Animal Health (I002869)

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

Credits 6.0 **Study time 168 h** **Contact hrs** 88.0h

Course offerings in academic year 2022-2023

A (semester 2) English Gent

Lecturers in academic year 2022-2023

Forlenza, Maria	WAGENI01	lecturer-in-charge
Wiegertjes, Geert F	WAGENI01	co-lecturer

Offered in the following programmes in 2022-2023	**crdts**	**offering**
International Master of Science in Health Management in Aquaculture	6	A

Teaching languages

English

Keywords

fish and livestock, farmed animals, aquaculture, innate and adaptive immunity, immune organs, bacterial, viral, parasitic diseases, disease prevention, health management; immune defence strategies, immunostimulation, immune response to infection and vaccination

Position of the course

The course aims to provide knowledge on the immune system of farmed animals (fish and livestock) and how recent developments inspire new strategies for disease prevention, e.g. vaccination or immune stimulation.
Considering the fast growth of the aquaculture sector as well as the worldwide intensive livestock farming, it is important to guarantee the health and welfare of these farmed animals. These animals, even when kept under controlled farming conditions are continuously exposed to a myriad of infectious agents, some of which can also be transmitted between animal species or to humans (zoonosis). Therefore, to prevent disease outbreaks under farming conditions, understanding the defence system of farmed animals and how we can stimulate it, is of utmost importance. Immunostimulation through e.g. feed often relies on innate immune responses. There is no doubt that vaccination, which relies on adaptive immune responses, is the most specific and effective disease prevention method currently available. Effective vaccines have to take into account not only the nature of the pathogen, but also the immune system of the host. But when it comes to farmed animals (fishes, birds, mammals), the variety among species can be extremely high. Therefore, it is only by being aware of the specific features of the immune system of fish and other farmed animals that we can design the best disease-prevention strategies tailored to the animal species. Yet, there are also many communalities to learn from.

Contents

1 Identification and recognition of the organs, cells and molecules that play a major role in the immune defence of fish and selected major livestock species.
2 Comparison between the immune reaction against relevant pathogens of fish and selected major livestock species.
3 Exemplification of the specifics of the immune system of fish and other farmed species;
4 Practical experience with the immune response analysis to pathogens, with focus on fish pathogens
5 Practical experience with vaccine design (e.g. nucleic acids-based vaccines; subunit vaccines);
6 Formulate research questions relevant to an internship or a thesis;
7 Resolve research questions applicable to an internship or a thesis;

8 Critically evaluate research papers and translate these into a comprehensive personalized review.

Initial competences

Competence for admission to EM AquaH study program and first semester courses at UGent. Bachelor of Animal Sciences or Bachelor of Biology. Basic immunological knowledge is assumed.

Final competences

1 *At the end of this course the student is expected to be able to:*
identify and recognize the organs, cells and molecules that play a major role in the immune defence of fish and selected major livestock species.

2 *explain and compare the immune reaction against relevant pathogens of* fish and selected major livestock species.
3 *apply the theoretical knowledge acquired during the course to analyse the immune response to pathogens*
4 *apply the theoretical knowledge acquired during the course to the design of vaccination strategies;*
5 *apply the theoretical knowledge acquired during the course to formulate research questions relevant to an internship or a thesis;*
6 *apply the practical knowledge acquired during the course to resolve research questions applicable to an internship or a thesis;*
7 *critically evaluate research papers and translate these into a comprehensive personalized review.*

Conditions for credit contract

This course unit cannot be taken via a credit contract

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture: plenary exercises, Practicum, Demonstration, Online discussion group, Group work, Lecture, Self-reliant study activities

Extra information on the teaching methods

Through a series of tutorials, problem-oriented learning assignments as well as practicals, the students will learn about the main immune organs and the main elements of the innate and adaptive immune system of fish and other livestock species. Through selected examples of infectious diseases (including zoonotic diseases) affecting various farmed animals, the students will learn about communalities and differences among the immune defence strategies against bacterial, viral and parasitic diseases of warm- and cold-blooded farmed animals. Blended teaching will be applied, using digital strategies in tandem with best practice in the classroom. Digital and face-to-face teaching may alternate according to a fixed schedule. Latest knowledge on how infections not only alter the metabolism of an animal, but also their immune system and their behaviour, as well as how changes in the behaviour of animals can be used to better detect disease outbreaks and monitor animal welfare, will be addressed. Finally, the acquired knowledge on the specific immune system of selected farmed animals will be applied to the design of vaccination strategies for disease prevention. To this end, practicals will deal with various cellular, molecular and biochemical techniques (cell culturing and stimulation, gene expression analysis, gene cloning, nucleic acids vaccine design, radicals production, cytokine detection through western blot or ELISA) aiming to understand the host immune response to infection and vaccination. Practicals also include the histological analysis of immune organs of fish and other major livestock species.
The expertise level is such that it prepares for an Internship or a MSc thesis supervised by the Aquaculture and Fisheries Group or the Adaptation Physiology Group of the Department of Animal Sciences.

Learning materials and price

A Course Manual specifically developed for this course will be for sale at the University bookshop. Recommended background reading will be listed. A manual for the practical course and review articles for individual assignments will be provided during the course. Power point presentations will be uploaded on Brightspace prior to the lectures and whenever possible, lectures will be broadcasted on WURTV or recorded in Teams.
Any additional information about the course will be provided on Brightspace.

References

Course content-related study coaching

Assessment moments

continuous assessment

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

Participation

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

Examination methods in case of permanent assessment

Report, Participation, Written examination with multiple choice questions, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Calculation of the examination mark

The normal grades are between 0-10 and 6 ECTS achieved if passed (>5.5)