

# Advanced Course: Bacteriophages – from biology to applications (2.5 days, 2 ECTS)

## General Information

*Organizers:* Dr. Cédric Woudstra and Prof. Miia Lindström, Department of Food Hygiene and Environmental Health, Faculty of Veterinary Medicine, University of Helsinki

*Doctoral programs:*

- Doctoral Program in Food Chain and Health

*Date:* The course will take place on 16 - 18 September 2019 (2.5 days in total).

*Venue:* EE-building room B437, Faculty of Veterinary Medicine, University of Helsinki

*Language:* English

*Registration:* Please register by filling the registration form on the course page

<https://courses.helsinki.fi/en/FHDP-145/129900560>

There is a limited number of places available. Registration is on first-come, first-served basis.

*Background:* In a world where the misuse of antibiotics has given rise to multi-resistant bacteria, bacteriophages (virus that infect bacteria) appear as a viable alternative to treat pathogenic bacteria responsible for life threatening diseases. Enroll to learn more about the biology of these fascinating nanomachines, their interaction with the bacteria they target and how they can be modified and used to help Human needs. Visit <https://vimeo.com/275090737> to get an idea about bacteriophage basics and how we can benefit from them.

*Topics:* Host-bacteriophage interaction  
Phage engineering, CRISPR  
Epigenetic modification in phage  
Phage inducible chromosomal island  
Phage endolysin application in detection and control of pathogens  
Phage therapy

*Assignments:* Each student registering to the course will be expected to present a poster about their own research work. In addition, at least 80% attendance at the lectures is compulsory.

*Confirmed Speakers:*

- Dr. Steven Hagens, Microcos, Wageningen, The Netherlands
- Dr. Timo Lehti, University of Helsinki, Finland
- Prof. Andrew Millard, University of Leicester, UK
- Prof. Sylvain Moineau, University of Laval, Quebec
- Prof. José R. Pénades, Glasgow Biomedical Research, UK
- Prof. Mathias Schmelcher, Institute of Food, Nutrition and Health of ETH Zurich, Switzerland
- Prof. Lotta-Riina Sundberg, University of Jyväskylä, Finland
- Dr. Peter R. Weigle, New England Biolabs, Ipswich, USA
- Dr. Cédric Woudstra, University of Helsinki, Finland
- Dr. Zhang Zhen, University of Helsinki, Finland

*Contact Information:* For matters relating to the course and additional information, please contact:

Dr. Cédric Woudstra ([cedric.woudstra@helsinki.fi](mailto:cedric.woudstra@helsinki.fi)) or Prof. Miia Lindström ([miia.lindstrom@helsinki.fi](mailto:miia.lindstrom@helsinki.fi))

## Course Programme

Duration of each lecture: 50 minutes (+10 min questions/discussion).

### *Day 1: Monday 16.09.2019 - Room: B437 (4<sup>th</sup> Floor)*

09:00 – 10:00 **Sylvain Moineau, Département de biochimie, de microbiologie et de bio-informatique, Faculté des sciences et de génie, université Laval, Québec**  
Phages and CRISPR-Cas Systems: The ongoing battle

10:00 – 11:00 **Lotta-Riina Sundberg, University of Jyväskylä, Finland**  
Eco-evolutionary interactions of phages and metazoans

11:00 – 11:20 Coffee break

11:20 – 12:20 **Timo Lehti, University of Helsinki, Finland**  
Border crossing: Bacteriophage interactions with eukaryotic cells

12:20 – 13:30 Lunch break

13:30 – 14:30 **Jose R. Penades, Infection Immunity Inflamm, Glasgow Biomedical Research, UK**  
Genome hypermobility by lateral transduction

14:30 – 15:30 **Andrew Millard, University of Leicester, UK**  
Exploring the vast diversity of vibriophages and their potential role in transfer of antibiotic resistance genes

15:30 – 15:50 Coffee break

15:50 – 16:50 **Jose R. Penades, Infection Immunity Inflamm, Glasgow Biomedical Research, UK**  
Phage inducible chromosomal island (PICl)

16:50 – 18:00 Social activity

### *Day 2: Tuesday 17.09.2019 - Room: B437 (4<sup>th</sup> Floor)*

09:00 – 10:00 **Dr. Peter R. Weigle, Research Department, New England Biolabs, Ipswich, USA**  
Finding, characterizing, and recreating the complex DNA-modifications of bacterial viruses

10:00 – 11:00 **Andrew Millard, University of Leicester, UK**  
Engineering coliphages: optimisation and applications

11:00 – 11:20 Coffee break

11:20 – 12:20 **Sylvain Moineau, Biochemistry, microbiology and bioinformatic departement, Faculty of Science and Engineering, Laval University, Québec**  
Phages as friends and enemies in food processing

12:20 – 13:30 Lunch break

13:30 – 14:30 **Mathias Schmelcher, Institute of Food, Nutrition and Health of ETH Zurich, Switzerland**  
Bacteriophage endolysins – powerful tools for detection and control of pathogenic bacteria

14:30 – 15:00 **Zhang Zhen, University of Helsinki, Finland**  
The use of phage endolysin on *Clostridium botulinum*

15:00 – 15:30 **Cédric Woudstra, University of Helsinki, Finland**  
Is the botulinum toxin locus part of a mobile genomic island?

15:30 – 15:50 Coffee break

15:50 – 17:00 **Poster session**

17:00 – 18:00 Social activity

### ***Day 3: Wednesday 18.09.2019 - Room: B437 (4<sup>th</sup> Floor) morning session***

09:00 – 10:00 **Steven Hagens, Microeos' Chief Scientific Officer, Wageningen, The Netherlands**  
Bacteriophage biocontrol of zoonotic agents for improving food safety – on product versus in vivo strategies

10:00 – 11:00 **Mathias Schmelcher, Institute of Food, Nutrition and Health of ETH Zurich, Switzerland**  
Engineered peptidoglycan hydrolases for treatment of staphylococcal infections

11:00 – 11:20 Coffee break

11:20 – 12:20 **Steven Hagens, Microeos' Chief Scientific Officer, Wageningen, The Netherlands**  
Phage-based approaches in animal health – from diagnostic tools to improving animal health

12:20 – 12:30 Closure and feedback

### **Additional information for the students**

Each student will have to present a poster of the scientific concept or idea of his/her thesis.