UNIVERSITY OF CAMBRIDGE

Institute of Continuing Education

Infection and immunity in plants and humans: surprising parallels, obvious differences and tangible impacts.

Start date		**End date**	
Venue	Madingley Hall Madingley Cambridge		
Tutor	Dr Aleksandr Gavrin Dr Panchali Kanvatirth	**Course code**	

Director of Programmes	Emma Jennings
For further information on this course, please contact	Public Programme Coordinator, Clare Kerr clare.kerr@ice.cam.ac.uk or 01223 746237

To book See: www.ice.cam.ac.uk or telephone 01223 746262

Tutor biography

Aleksandr Gavrin is a Research Associate at the Sainsbury Laboratory, University of Cambridge (UK). His current research focusses on the investigation of common developmental mechanisms impacting on interactions of plants with symbiotic and pathogenic microorganisms. Prior to that, during a PhD at Wageningen University (Netherlands) and a post doc at the University of Sydney (Australia) he studied developmental aspects of the legume-*Rhizobium* symbiosis. His primary research goals are directed towards understanding the molecular genetic mechanisms of plant-microbe interactions.

Panchali Kanvatirth is a Research Associate at the Department of Veterinary Medicine, University of Cambridge (UK). Her current research examines how the immune system impacts the host-pathogen interaction during infection and after antibiotic treatment. During her PhD at the University of Birmingham (UK), she focused on repurposing drugs for Tuberculosis treatment and deconvoluting the ways in which the drugs can kill the bacteria causing Tuberculosis. The key theme that directs her research is to understand drug resistant bacteria within a host using *in vivo* models, which could potentially influence better use of antibiotics.

Course programme

09:30 Terrace bar open for pre-course tea/coffee

10:00 – 11:15 **Session 1 Microbes (the good, the bad and the ugly)**

An overview of microbiology presenting a general introduction to the world of microorganisms primarily bacteria, fungi and viruses; an insight into their structural organisation, genetics and infections.

11:15 Coffee

11:45 – 13:00 **Session 2 The human immune system**

The principle components of the human immune system detailing the two main types: innate and acquired immune systems.

13:00 Lunch

14:00 – 15:15 **Session 3 The plant immune system**

Current view of the plant immune system represented as a four phased 'zigzag' model and comparison of innate immune systems in plants and animals.

15:15 Tea

15:30 – 16:45 **Session 4 Immunity and infection: What does it mean for our day to day life?**

The impact of human immunity on human health and healthcare; plant immunity on crop production and food security.

16:45 Day-school ends

Course syllabus

Aims:

- To introduce students to the general concepts of microbiology and host-microbe interactions.
- To examine and explain the differences and similarities between plant and human immunity.
- To provide a comprehensive overview of how microbes and the immune system play a major role in food security, human health and wellbeing.

Content:

Have you ever considered how 'simple' organisms like bacteria and viruses can have such a big impact on other 'complex' lifeforms? Without a microscope, they are invisible, but their effects are all too obvious - they make us sneeze, cough, and bend over in pain, but are they always "the bad guys"? In this course, we will delve into the world of these tiny organisms and find out more about them. In the first session, we will discuss the different types of microorganisms and how they cause infections. The course will primarily cover three types of microbes: bacteria, fungi and viruses. In the second session we will focus on core principles of innate and acquired immunity in animals considering the human immune system as an example. After lunch, we will provide an overview of the fundamental basis of immunity in the plant kingdom and will define the main similarities and differences between animals and plants mechanisms of immunity. In the final session, we will discuss the impact and importance of microbes and the immune system in our day-to-day life through real world examples and incidents.

Presentation of the course:

The course will be taught primarily using oral presentations, which will include short descriptive videos and graphics. Along with this, small models and plush toys will be used to demonstrate various microbial and immune cells to give students a visual and tactile aid in order to assist with understanding the concepts covered in the course. There will be opportunity for interactive quizzes, discussions and sharing ideas and opinions during each session.

As a result of the course, within the constraints of the time available, students should be able to:

- Acquire a general knowledge and understanding of the microbial world and the basic concepts of infections caused by microbes;
- Understand the key aspects of the immune systems in plants and human beings;
- Recognise and appreciate the impact of microbiology, infections and the role of the immune system on an individual's daily life.

Reading and resources list

Listed below are texts that might be of interest should you wish to supplement your learning on the course. Any essential reading is marked with an asterisk *

Author	Title	Publisher and date
*Michael J Pelczar, Jr.,E C S Chan Noel R Krieg	Microbiology: An Application based approach	McGraw Hill Education
Anthony Nash,Robert Dalziel J. Fitzgerald	Mims' Pathogenesis of infectious disease (6th edition)	Academic Press, 2015
Michael T. Madigan,John M. Martinko, Kelly S. Bender,Daniel H. Buckley David A. Stahl	Brock Biology of Microorganisms (13th edition)	Pearson, 2011
Judy Owen,Jenni Punt Sharon Stranford	Kuby Immunology (7th edition)	Macmillan Higher Education, 2013
Abul K. Abbas, Andrew H. Lichtman	Basic Immunology	Saunders, 2001
*Charles Janeway Jr.,Paul Travers	Immunobiology- the immune system in health and disease (5th edition)	Garland publishing, 2001
Jonathan D. G. Jones and Jeffery L. Dangl	The plant immune system	Nature 2006; 444:323–329
Zipfel C. and Oldroyd G.E.	Plant signalling in symbiosis and immunity.	Nature 2017; 543:328-336.

Website addresses

http://microbiologyonline.org/about-microbiology

https://www.asm.org/division/w/web-sites.htm

http://www.microbiologybook.org

Additional information

Venue

Details of how to find Madingley Hall can be found on our website:
http://www.ice.cam.ac.uk/who-we-are/how-to-find-the-institute

Refreshments

Tea and coffee and lunch will be provided. If you have any specific dietary requirements or allergies and have not already advised us, please inform our Admissions Team on ice.admissions@ice.cam.ac.uk or +44 (0)1223 746262.
Note Students of the Institute of Continuing Education are entitled to 20% discount on books published by Cambridge University Press (CUP) which are purchased at the Press bookshop, 1 Trinity Street, Cambridge (Mon-Sat 9am – 5:30pm, Sun 11am – 5pm). A letter or email confirming acceptance on to a current Institute course should be taken as evidence of enrolment.

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