



# SCIENCE AND EDUCATION **FOR** **SUSTAINABLE** **LIFE**

Swedish University of Agricultural Sciences  
School of Organismal Biology  
International PhD course

## **PATHOBIOMES AND PLANT IMMUNITY**

<b>Syllabus approved</b>	February 22, 2021
<b>Numb. Credits</b>	Full time <b>5</b> , Part-time <b>2</b> .
<b>Subject</b>	Biology, Plant Biology, Plant Pathology
<b>Language</b>	English
<b>Numb. Students</b>	Full time: min 12 -max 20, Part time: not-limited.
<b>Contact</b>	Salim Bourras (SLU) <a href="mailto:salim.bourras@slu.se">salim.bourras@slu.se</a>

## Full-time participation

<b>Prerequisites</b>	Full time participants must be admitted to graduate studies for a PhD degree in the broad area of biological sciences, and should have basic knowledge in the subject areas of plant pathology and plant-microbe interactions (e.g. have completed a basic course in the subject areas, <b>or</b> have completed an MSc project in the subject areas, <b>or</b> are perusing a PhD within the subject areas).
<b>Objectives</b>	This course will provide students with the opportunity to understand emerging concepts in the field of plant-microbe interactions based on the study of pathogen-pathogen, pathogen-microbiome, and plant-microbiome interactions, with a particular focus on crops. Their implications for plant immunity will be analyzed, and important gaps of knowledge in the field will be highlighted. Finally, challenges and opportunities for research in the field will be discussed in light of state-of-the art technological advances.
<b>Content</b>	<p>The course is structured in four modules:</p> <p><b>Module 1 _ Literature to read</b> (self-study): the students will receive a list of core publications to study in order to get an overview of the research in the field. The provided list is not exhaustive and should serve as a basis for further readings based on the students' favorite study system and scientific interests.</p> <p><b>Module 2 _ Lectures</b> (online via Zoom): the students will attend 16 lectures which will be given by an international panel of researchers with diverse backgrounds and highly relevant expertise in the field. Here, the students will build on Module 1, and will have the opportunity to challenge and consolidate their understanding during the lectures.</p> <p><b>Module 3 _ Theme based workshops</b> (online via Zoom): during these workshops, the students will work in small groups of 3 people on practical cases prepared by the teachers, formulate their own hypotheses, and work on experimental designs to test them. These workshops will give the student a good basis and a structure they can replicate to write the research proposal.</p> <p><b>Module 4 _ Writing a short research proposal</b> (self-study): the students will be required to write a short research proposal (4 pages), including a well-described experimental plan, aiming at the study of pathogen-pathogen, or pathogen-microbe, or plant-pathobiome interactions, in a system of their choice. The proposal will be graded, and the students must obtain a minimum score of 3 (max score is 5) to obtain the credits.</p>

## **Deliverables**

- **Module 2:** Students-led recap. 15 minutes, first thing in the morning. Students will take turns in small groups of 3 peoples to summarize the main discoveries, methods, and challenges from the lectures given the day before (1 group per day).
- **Module 3:** a short 10-15 minutes group presentation at the end of each workshop.
- **Module 4:** a 4 pages max research proposal following a specific structure and guidelines that will be provided at the beginning of the course.

## **Learning outcomes** The students should be able to:

- Develop basic understanding of the evolutionary, genetic, and molecular mechanisms underlying pathogen-pathogen, pathogen-microbiome, and plant-pathobiome interactions.
- Develop critical understanding of the conceptual and experimental challenges in the field.
- Identify gaps of knowledge in the field, formulate new working hypotheses, and design experiments to test them.
- Combine the first three point to write a short research proposal on which they will get feedback from the teachers.

## **Part-time participation**

Considering the online format of the course, we will be offering the possibility for part-time participation to students from the broader field of biological sciences. Basic background in plant pathology and plant biology and microbiology is strongly recommended but not required. Part time participation will include access to all lectures (but not the workshops), and students will be required to write a 2-3 pages synthesis based on a few lectures of their choice. The essay will be reviewed and graded, and the student must score minimum 3 (max is 5) to obtain the credits.