

# Syllabus: PLG0035 Plant Protection Biology: improving plant health under climate change and other stresses, 7.0 credits

*Växtskyddsbiologi*

**Subject:** Biology

## **Prerequisites:**

PhD students interested in e.g. (agro)ecology, entomology, plant breeding, plant molecular biology, nematology, mycology, plant protection, plant pathology, IPP/IPM, pest/pathogen and plant interactions, climate change, biotic and abiotic stress.

## **Number of credits:**

7.0 ECTS

## **Purpose:**

The environmental awareness is increasing, to some extent because of the increasing number of reports on global climate change. This has and will continue to have a large impact on management of future cropping systems, especially concerning plant protection. The overall objective of this course is to give PhD students from different subject areas (e.g. ecology, entomology, nematology, plant breeding, molecular biology etc.) a deeper understanding of challenges and constraints in relation to modern plant protection in different systems. Different protection strategies will be set in relation to the stresses to the agricultural system induced by climate change. This is intended to give the students a broad scientific basis for current and future work in relation to development of environmentally sustainable plant protection methods, in addition to their own specialization. Furthermore, influences and inputs from related fields may create new ideas and inspire new approaches in ongoing projects. Whether the students stay in science or move on to other careers (e.g., at private companies or national boards for agriculture or similar institutions) after finishing, a broad knowledge of plant protection will be valuable.

## **Learning outcome:**

- The students should be able to show broad insights of the biological aspects of plant protection, including:
  - The natural system vs the cultivated system
  - Plant defense
  - Ecology/biology of the pests and pathogens
  - Pest/pathogen-plant interactions
  - Molecular mechanisms of host and pest/pathogen interactions
  - Pest/pathogen management methods and strategies
- Be able to use the latest results and trends within plant protection as part of the project-based learning case scenarios, and use them to evaluate their own research in a broader perspective

## **Content:**

The aim of the course is to bring together PhD students from different backgrounds (biology, agronomy, horticulture,

agroecology etc.) working on plant protection related areas and set them in relation to aspects of policy governing their field of study. To account for the expected diversity of student backgrounds and to make sure that they are on a comparable scientific level in the management strategy discussions, some lectures in the beginning will be devoted to introducing the fundamental aspects of the topic. The lecturers will be asked to give a brief basic introduction to the subject area and then to move on and end with the latest results (which will also be discussed during the literature seminars).

The following topics will be dealt with during the course: A comparison of the natural system and the cultivated system - why do different organisms become pests? Plant defense, resistance biology and breeding. Pests and pathogens (especially insects, nematodes, fungi, oomycetes) - ecology/population dynamics, life cycle etc. - some typical examples from each group. Crop loss assessment and presentation of different management methods, e.g. biological and chemical control, resistance breeding, molecular tools, disease prediction, chemical ecology/pheromones etc. Development of management strategies based on the different methods that are at hand - examples from different cropping systems - agriculture, horticulture and forestry. How current knowledge in plant protection is translated into policy and regulation of agriculture and forestry. How the threats from pathogens and pests can be expected to be affected by climate change. How different protection strategies is affected by and can be adapted to climate change.

#### **Pedagogical form:**

It is important that the students take active part in their own learning. Therefore, they will do a 'case study' that will be presented both orally - where all students should participate actively in the discussions - and as a written report. The work should be done in groups to profit from the different expertise of the students in the discussions and development of management strategies. In addition, they will get a chance to practice oral presentation when they present their own research. The literature seminars will give them an opportunity to read recent and relevant literature (papers selected by the lecturers and handed out before the course) and to discuss - in smaller groups - with each other and experienced scientists (the lecturers) within the subject area.

#### **What is required to pass:**

The marking scale will be pass/failed. The criteria for attaining the different grades will be:

1. Attendance during course lectures
  2. Oral presentation of own research
  3. For each literature seminar, a smaller group of students will be asked to formulate and submit questions and topics for discussion based on the lectures and the assigned readings to start off the discussion. The submission of these questions and topics will be a criterium for passing.
  4. Oral and written report of the project-based learning case study presenting a pest/pathogen management strategy for a cultivation system or global pest/pathogen problem. In the project an appropriate management strategy should be proposed, the impact of climate change should be considered, knowledge gaps be identified, an IPM strategy be considered and the growers' social, economic and technological needs be considered
- Current information on assessment criteria shall be made available at the start of the course.

#### **Literature/links:**

A course homepage will be set up and literature provided in the form of research articles, reviews and book chapters.

**Additional information:**

The course is given 8-19 August 2022

Application and further information: [erik.alexandersson@slu.se](mailto:erik.alexandersson@slu.se)

Application no later than 1 July 2022

Course organizer: Dept. of Plant Protection Biology, LTV-faculty, SLU.

Minimum of participants to give the course is 12 students.

Maximum number of participants is 30 students.

Note that the course is also open for up to 12 MSc students associated to ELLS universities.

**Responsible department**

Dept. of Plant Protection Biology, LTV-faculty, SLU

**Location**

Alnarp, Sweden