

Course plan

<i>Course Title:</i>	Plant diseases; from survival to epidemics, and management strategies
<i>ECTS:</i>	5 or 6 (flexible depending on institution and the student's input)
<i>Objectives:</i>	<p>The overall objective for the course is to present a survey of concepts integrating pathogen biology, pathogen ecology and disease management including how their study can be assisted using modern techniques. Key concepts will include survival of intercrop periods, inoculum production and dispersal in both soil and air. The students should learn the significance of soil heath and disease suppressiveness, and how ontogenic resistance, crop phenology and climate affect the susceptibility of the host, and severity of epidemics, through the interplay between abiotic and biotic factors</p> <p>The course should equip students for further directed and independent study of the key concepts, and to integrate biological and ecological concepts within the context of modern disease management programs.</p>
<i>Pre-required knowledge:</i>	The students should have basic knowledge in plant pathology, microbiology, plant biology and genetics relevant to plant pathology. They should preferably work in project dealing with plant-microbe interactions or have a strong background in microbial ecology and plant physiology.
<i>Examination elements:</i>	<p>The students will be assessed based on:</p> <ol style="list-style-type: none"> 1. Their activity in the national study groups before the intensive course week. 2. Their presentations during the course. 3. Additional element: a small report where they present how their new knowledge and the methods they have learned during the course can be utilised to study their own research topic.
<i>Pre-campus assignment: (incl. deadline)</i>	To insure that all the students have relevant background and can follow the lectures and exercises, they will receive a list of relevant literature (approximately 50 research and review papers) that should be read and discussed before the course. The students will form study groups nationally, and these groups are normally tutored by a Nordic teacher. This assignment is estimated to a work load of 100h
<i>Post-campus assignment: (incl. deadline)</i>	A short report where the students present how they could utilise their new knowledge and the methods they have learned during the course to study their own research topic. Deadline is 2 weeks after the course.
<i>Pedagogical approach:</i>	<p>Literature Studies: As described under pre-campus assignment</p> <p>Lectures: The core of the one-week intensive course will consist of lectures</p>

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given by and discussions led by the invited international experts and the Nordic teachers.

Student presentations:

Students will make an oral or poster presentation based preferably on their own research projects and related to the course theme.

Group Discussions:

Group discussions are scheduled for the evening to enable the students review what they have learned during the day. Additional topics for these discussions include career opportunities in plant pathology, in a regional, Nordic, European, or global context.

Scientific content: Practical applications of advances in molecular biology and disease modeling are sometimes limited by a lack of knowledge of the biology of the pathogen. Pathogen survival, dispersal, infection, trophic strategy and propagation can be crucial steps in disease development and disease management. Sustainable disease management in crop production depends on a fundamental understanding of the life cycle of a pathogen, its biology and ecology. This course will focus on several aspects of classical plant pathology that have become increasingly important as we progress towards biologically-based pest management. Assisted by modern techniques in biological research, our knowledge and understanding of pathogen biology and ecology have increased significantly over the last decade.

The course will present a survey of concepts integrating pathogen biology, pathogen ecology and disease management, including how their study can be assisted using modern techniques. Pathogen survival of intercrop periods, inoculum production and dispersal in air and soil are important elements in the course. Equally important elements are the interplay between abiotic and biotic factors that affects the host susceptibility and pathogen vulnerability, and severity of epidemics. **Key concepts in the course will include:**

- Pathogen survival between crops
- Soil inoculum potential
- Soil suppressiveness to diseases
- Ontogenic resistance
- Crop phenology
- Infection periods
- Inoculum production and release
- Biologically-based disease management

Selected case studies demonstrating the merging of modern techniques with traditional disease etiology and management will be presented.

Other information: _____

Information in fields below will not, in contrast to the information above, be used in the course plan published on the NOVA web pages.

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Added value from non-NOVA teacher(s) Two external teachers are invited to teach at the course. These teachers are renowned experts in the field of pathogen biology and ecology, and have complementary backgrounds and interests.

Dr. David Gadoury from Cornell University, USA, has his expertise in the biology, ecology, and epidemiology of airborne biotrophic plant pathogens. He is one of the world top scientists in fruit pathology.

Professor Claude Alabouvette from INRA and Universite de Bourgogne, Dijon, France is a world-renowned expert in the area of soilborne diseases and biological control.

Motivate if the number of teachers exceeds 10:

Other teacher(s):*

- Name
- Titles
- Assignments
- Qualifications

Professor Anne Marte Tronsmo (UMB). Course organiser. General plant pathology, diseases caused by fungi

Professor Arne Stensvand (UMB). Co-organiser. Diseases caused by fungi.

Professor David B. Collinge (KU-LIFE). Molecular genetics of host defence

Professor Minna Pirhonen (HU-AF). Diseases caused by bacteria.

Professor Jonathan Yuen (SLU). Plant disease epidemiology, risk assessment

Professor Dan F. Jensen (SLU). Biocontrol of plant diseases

Senior Scientist Mogens Hovmøller (AU-DJF). Population genetics, evolutionary biology and epidemiology of crop pathogens.

Nordic dimension: The core subject of the course, plant pathology, is a small subject in all Nordic countries. PhD courses with internationally well-known teachers cannot be organised at national level due to a low number of students in each country. A Nordic course provides a sufficient number of students and a critical mass ensuring an interesting course. Furthermore, the course promotes collaboration between researchers (students and teachers) in different countries.

Joint PhD courses in various plant pathology related topics have been given since 1980. These courses form a core for PhD education in plant pathology in the Nordic countries and have provided a depth that would not have been possible if the courses were given by a single university.

The topic of the course is highly relevant for a large group of students. However, the support from NOVA is a prerequisite for the organisation of the course.

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Other information: The first Nordic PhD courses in Plant pathology were arranged in Finland in 1980, and the topic was Biological control, at that time a rather young theme in Plant Pathology. The current course will represent the 25th in the series, and the course topic is partly a revisit of the first one given 30 years ago. We plan to use this opportunity to also hold a network meeting, and review some of the progress in this area during 3 decades. If we can find the necessary additional funding, we will invite 2-3 keynote speakers to do this.

* By *other teacher* refers to teacher with minor amount of lecturing or tutoring on the course. Main teachers must be registered with CV in step 4 in the application system.