## **Crop protection**

## Proff. Tito Caffi – Ilaria Negri

# .- Crop protection (Mod. Plant pathology)

Prof. Tito Caffi

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

Myth, history and science: how Christians' devotion to Saint Anthony is related to the Salem witches’ trials? Why the ancient Romans established a festivity when slaughtering animals in the name of the god Robigus? What was the preferred beverage in England before that the "decaffeinator" started its devastation in the Colony? Why people moved away from Ireland at the end of 19th Century? These are (some) reasons to study plant pathology and learn how to protect crops in a sustainable way.

**Knowledge and analysis ability**

The primary goal of the course is to provide the students with the basic knowledge necessary to recognize the major crop diseases, learn the basis for their diagnosis and acquire the skills for their control.

**Know-how and its application**

At the end of the course students are supposed to know the main characteristics of causal agents of plant diseases and disorders. Furthermore, they are expected to correctly apply their know-how to describe the main stages of the infection cycle of plant diseases and illustrate the main host-pathogen interactions, demonstrating their familiarity with different techniques and practices of crop protection that would allow them to recognize and properly describe the symptoms of the main diseases of important crops (wheat and tomato).

**Autonomy in self-assessment**

At the end of the course the students are expected to be able to apply knowledge and understanding in order to select and properly justify the crop protection intervention requested by a specific condition/scenario.

**Communications skills**

The students are supposed to learn how to communicate with a proper technical language and terminology in both oral and written forms.

**Learning capacities**

Regardless of previous background, at the end of the course the students will have to hold learning capacities suitable to either lead them to higher study courses or to successfully tackle a job appointment.

***COURSE CONTENT***

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|  | ECTS  CREDITS |
| Introduction to plant pathology: from the disease concept, to disease classification and their diagnosis. Main characteristics of abiotics as well as biotics causes of disease. A particular focus will be provided on describing parasitic plants, fungi, bacteria, viruses, fastidious bacteria and phytoplasmas. Main approaches, methods and techniques for diagnosis will be described, always considering the pillars of Koch’s postulates. | 2 |
| The infection process will be studied and the infection cycle (inoculation, penetration, incubation, evasion and dissemination) as well as the disease cycle (monocyclic and polycyclic diseases) will be analysed. Host-pathogen interaction will be faced and the effect of environmental factors (i.e. weather, soil and agronomic factors) will be studied. | 2 |
| Disease control will be considered following the concepts of sustainable agriculture and integration of different measures targeted to the pathogen (i.e. preventative, curative and eradicant treatments with plant protection products, natural products and biocontrol agents), the host (i.e. resistance) and the environment (i.e. agronomic and mitigation measures). | 1 |
| PRACTICAL CLASSES/TUTORIALS. Lab and field activities regarding species identification and sampling. | 1 |
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***READING LIST***

Plant Pathology, 5th Edition. 2005, George Agrios, Academic Press, ISBN: 9780120445653, pp 952.

Additional reading materials will be provided during the course via Blackboard.

***TEACHING METHOD***

The teaching method is composed by the following aspects:

1. Lectures, provided by the Instructor in indoor class;
2. Case studies, working groups and interactive exercises, provided during classes in order to follow the students learning process;
3. Specific lab and field activities, provided by the Teaching Assistant and concerning species identification and sampling.

***ASSESSMENT METHOD AND CRITERIA***

Written exam. It will be delivered at the end of the course and/or on official exam dates. The students will have 45 minutes to answer 30 questions (different type of questions: multiple choice, put in the right order, link concepts, ect.) plus one open question (minimum and maximum number of words): each correct answer will provide 1 point and the open question 2 points. The score is given on a scale of 30/30 (“cum laude” for really praiseworthy students).

The final mark of the exam will represent the weighted average of the Plant Pathology (6 out of 9 ECTS) and the Entomology (3 out of 9 ECTS) modules, agreed by the two Instructors.

#### *NOTES AND PREREQUISITES*

Lesson frequency is not mandatory, but strongly encouraged. Students must register via Blackboard to the course and check regularly for further information or updates. The teaching material will be provided only via Blackboard (just before classes).

The Instructor will meet students after classes upon arrangement by email at the Department of Sustainable Crop Production (3rd floor, room 275).

# .- Crop protection (Mod. Entomology)

Prof.ssa Ilaria Negri

***COURSE AIMS AND EXPECTED LEARNING OUTCOMES***

The aim of the course is to provide basic knowledge about classification, morphology and anatomy, biology, ethology, and ecology of the main crop pests (i.e., insect harmful to grapevine, cereals and horticultural crops), related damages, plant symptoms, and integrated pest management strategies.

At the end of the course, the following learning outcomes are expected:

**Knowledge and analysis ability**

Students are expected to acquire knowledge on the biology, ethology, and ecology of the main crop pests, the main methods and equipment for monitoring and sampling pests, the current pest management strategies with particular regard to biological and integrated control, and will understand the basic interactions between crop pests and the main components (biotic and abiotic) of agro-ecosystems.

**Know-how and its application**

Students are expected to be able to identify crop pests and symptoms (direct and indirect, if any) they induce on host plants, as well as their main natural enemies (predators, parasitoids, etc.); how to plan and implement non-pesticide indirect and direct measures to prevent or reduce pest attack; how to plan and implement plant protection according to the IPM principles.

**Autonomy in self-assessment**

Students are expected to be able to take decisions on the following issues: if, when and how to apply integrated control techniques to reduce the damage by insect pests.

**Communications skills**

Students are expected to acquire a proper technical language to present and discuss the main topics of the course.

**Learning capacities**

Regardless of previous background, at the end of the course the students will have to hold learning capacities suitable to either lead them to higher study courses or to successfully tackle a job appointment.

***COURSE CONTENT***

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| --- | --- |
|  | ECTS |
| Introduction to general entomology. Main crop pests (insect harmful to grapevine, cereals and horticultural crops) and beneficial insects to agriculture. | 1 |
| Direct and indirect plant damages. Insect vectors of plant pathogens. | 0.5 |
| Pest monitoring. Sampling, thresholds, and modeling. Pest management: chemical, biological and physical control; roles of semiochemicals; biotechnologies. Areawide Pest Management (AWPM) technologies and approaches. | 1 |
| PRACTICAL CLASSES/TUTORIALS. Class and field activity regarding species identification and sampling. | 0.5 |
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***READING LIST***

van Emden H. F., 2013 - Handbook of Agricultural Entomology. Wiley-Blackwell.

Chapman R.F., 2012 - The Insects. Structure and Function. Cambridge University Press

***TEACHING METHOD***

The teaching method consists of:

1) lectures covering the main topics of the course;

2) interactive teaching methods (problem solving, reading and discussing scientific articles, use of audio-visual materials, cooperative learning and peer education activities);

3) practical activities that include use of microscopes and stereoscopes for the observations and preparations of samples, and research-based approaches.

#### *ASSESSMENT METHODS AND EVALUATION CRITERIA*

Written exam. It will be delivered at the end of the course and/or on official exam dates. The students will have 45 minutes to answer 30 questions (different type of questions: multiple choice, put in the right order, link concepts, ect.) plus one open question (minimum and maximum number of words). Scores will be provided on a scale of 30/30 (“cum laude” for really praiseworthy students).

#### *NOTES AND PREREQUISITES*

Students should register at the course on the Blackboard platform and check it regularly for further information or updates.

The teacher will meet students after class at Department of Sustainable Crop Production.

Previous attending of the courses of Applied Agronomy and Horticulture is suggested.