

COURSE OF STUDY Bachelor Course Agricultural Sciences and Technologies (curriculum Plant Production and Crop Protection)

ACADEMIC YEAR 2023/2024

ACADEMIC SUBJECT General Plant Pathology

General information	
Year of the course	<i>III</i>
Academic calendar (starting and ending date)	September 25 th 2023-January 19 th 2024 (Pause 2022 November 13 th – November 24 th , for midterm exam)
Credits (CFU/ETCS):	6
SSD	<i>AGR/12 Plant Pathology</i>
Language	<i>Italian but English can be used for foreign students</i>
Mode of attendance	<i>Not mandatory but recommended</i>

Professor/ Lecturer	
Name and Surname	Francesco Faretra
E-mail	francesco.faretra@uniba.it
Telephone	
Department and address	Department of Soil, Plant and Food Sciences, South plexus, Third floor, Room n. 11
Virtual room	Teams code: ihlsbct
Office Hours (and modalities: e.g., by appointment, on line, etc.)	Monday to Friday, 9.00 a.m. – 1.30 p.m., by appointment (phone, e-mail, Teams). Tutoring can be done also on Teams or other web-based platforms.

Work schedule			
Hours			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
<i>Es. 150</i>	<i>32</i>	<i>28</i>	<i>90</i>
CFU/ETCS			
<i>Es. 6</i>	<i>4</i>	<i>2</i>	

Learning Objectives	The course aims to provide basic knowledge on plant diseases, their harmfulness and methods of measuring damages, interactions between plants, pathogens and environment, interactions between microbial populations, abiotic diseases, as well as approaches to prevention. In addition, the course deals with the main pathogenic fungi for plants. Detailed information on taxonomy, biological characteristics and identification criteria is provided. For representative fungi of the different taxonomic groups, the aspects relating to epidemiology, symptomatology and prevention are mentioned by way of example.
Course prerequisites	Basic knowledge of biology, botanic, agronomy and crop production

Teaching strategie	
Expected learning outcomes in terms of	
Knowledge and understanding on:	<ul style="list-style-type: none"> ○ Knowledge and understanding of diseases, symptomatology, plant-pathogen interactions, disease epidemiology, diagnosis, and basic principles of plant

	<p>protection.</p> <ul style="list-style-type: none"> ○ Knowledge and understanding of the taxonomy and main biological characteristics of phytopathogenic fungi.
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ Knowledge and understanding for defining a diagnostic approach in the field and/or in the laboratory. ○ Basic knowledge and understanding for identification and sustainable management of fungal diseases.
Soft skills	<p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> ○ Ability to understand the phenomena underlying the diseases, their spreading and harmfulness and their sustainable management. ○ Ability to understand the biological characteristics of the main taxonomic groups of phytopathogenic fungi. <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Ability of describing the biological phenomena underlying plant diseases, their spreading and harmfulness. ○ Ability of describing the main diagnostic methodologies applied to plant diseases. ○ Ability of describing the main biological characteristics of phytopathogenic fungi and the disease typologies they cause. <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> ○ Capacities of updating the knowledge on the characteristics of different plant diseases with emphasis on those caused by phytopathogenic fungi and on sustainable plant protection. ○ The results of the expected learning, in term of knowledge and ability, are listed in the Annex A of the Didactic Regulation of the Bachelor Course (expressed by the European descriptors of the study title).
Syllabus	
Content knowledge	<p>Presentation of the course; brief history of Plant Pathology; definition of disease and their economic importance; classification of plant diseases; evaluation of disease severity and yield losses. Morpho -functional alterations in infected plants (alterations of plants morphology, of plant cells and tissues, organs falling out, blight and wilting, gum and resin emission, pathogen sporifications, alterations of photosynthesis, respiration, carbohydrate transport, phenolic metabolism, water balance). Disease epidemiology (influence of environment on disease development, disease pyramid, factor related to environment, host, pathogen, crop management practices, etc., favouring the development of epidemics; epidemics forecasting). Biotic causal agents of plant diseases: fungi, bacteria, viruses, viroids and phytoplasmas. Abiotic factors: anomalous lighting conditions, water availability, thermal conditions, atmospheric composition, nutritional unbalances, wounds, cytotoxicity. The fungi and affine organisms: main taxonomic groups (Mucilaginous moulds, Oomycota, Chytridiomycota, Zygomycota, Ascomycota, Basidiomycota, Deuteromycota). Structure, ultra -structure and fungal growth: hyphae, cell wall and septa, cytoplasmic membrane, and organelles. The growth: filamentous fungi, yeast -like and dimorphic species; apical growth, branching and fusion, hyphal modifications (cordons, rhizomorphs, stroma and sclerotia), the fungal colony. Fungal spores: differentiation, release, dispersal, and germination. Hints on nutrition, primary and secondary metabolism, extracellular enzymes, external digestion, and defence: Growth media. Mycotoxins. Influence of environmental factors on growth and reproduction: water, temperature, light, pH, oxygen, and carbon dioxide. Hints on fungal genetics: sexuality, heterokaryosis and parasexuality, non-mendelian inheritance; genome and genomics; biotechnological aspects. Hints on integrated protection of plants from diseases. Diagnosis of plant diseases (traditional biological, serologic, and molecular methods). Koch's</p>

	<p>postulates. Basic techniques for isolation and growth of fungal pathogens. Macro- and microscopic observations of vegetative and reproductive structures of fungal species representative of the main taxonomic groups. Observations of phytopathological samples in the field and under laboratory conditions, identification of the main causal agents of diseases, evaluation of yield losses, application of main diagnostic techniques.</p>
Texts and readings	<p>Personal notes of the lectures and didactic materials distributed during the course.</p> <ul style="list-style-type: none"> • Belli G. (2012). Elementi di Patologia Vegetale. Piccin Nuova Libreria, Padova. • Vannacci G., et al. 2020. Patologia vegetale. Edises Università, Napoli. • Deacon J.W. (2001). Micologia moderna. Calderini Edagricole, Bologna. <p>Additional readings:</p> <ul style="list-style-type: none"> • Matta A., Bonauro R., Favaron F., Scala A., Scala F. (2017). Fondamenti di Patologia Vegetale. Patron editore, Bologna. • Reverberi M., Ruocco M., Covarelli L., Sella L. (2022). Patologia vegetale molecolare. Piccin, Padova. • Agrios G. (2005) Plant Pathology. 5th Edition. Academic Press, New York, USA. • Strange R. (2003) Introduction to Plant Pathology. Wiley. • Webster J., Weber R.W.S. (2008). Introduction to fungi. Cambridge University Press, Cambridge, Inghilterra. <p>Further materials will be provided on request by the teacher.</p>
Notes, additional materials	<p>Examples of websites</p> <ul style="list-style-type: none"> • http://erec.ifas.ufl.edu/plant_pathology_guidelines/index.shtml • www.apsnet.org/edcenter/ • www.dpvweb.net/index.php • http://plantpathology.ba.ars.usda.gov/phytoplasma.html • www.atlasplantpathogenicbacteria.it/index.htm • www.world-of-fungi.org • www.mycobank.org • https://h2020.myspecies.info/content/cbs-knaw-fungal-biodiversity-centre • www.mycology.net • www.aspergillus.org.uk • https://mycotoxinsite.com
Repository	<i>Team access code: ihlsbct</i>

Assessment	
Assessment methods	<p>Only the students enrolled in the academic year during which this discipline is offered, can have an intermediary exam during the teaching period of the discipline. The result of this intermediary exam remains valid for the whole academic year and concurs to the final evaluation of the student.</p> <p>The intermediary exam will be given on the subjects treated during the lessons and the practical activities as reported in the Didactic Regulation of the Bachelor course (art. 9) and syllabus (annex A) and which is correlated to the actual teaching period.</p> <p>At the end of the module teaching period, the students, who passed positively the intermediary exam, can give the final exam concerning on the subjects treated during the lessons and the practical activities since the intermediary exam, as reported in the Didactic Regulation of the Bachelor Course (art. 9) and syllabus (annex A) and which is correlated to the actual teaching period.</p> <p>Students who did not pass or give the intermediary exam will be examined on the whole subjects treated during the lessons and the practical activities as</p>

	<p>reported in the Didactic Regulation of the Bachelor course (art. 9) and syllabus (annex A) and which is correlated to the actual teaching period.</p> <p>The exam for foreign students can be given in English according to the above reported modalities.</p>
Assessment criteria	<ul style="list-style-type: none"> • <i>Knowledge and comprehension ability</i> <ul style="list-style-type: none"> ○ Ability to describe causes, symptomatology, plant pathogen interactions, epidemiology, and diagnosis of diseases. ○ Ability to describe the biological characteristics of the main taxonomic groups of phytopathogenic fungi. • <i>Knowledge and applied comprehension ability</i> <ul style="list-style-type: none"> ○ Ability to define appropriate diagnostic approaches in the field and in the laboratory for different cases. ○ Ability to recognize different disease typologies and to propose basic actions for their control. • <i>Autonomy of judgement</i> <ul style="list-style-type: none"> ○ Ability to formulate hypotheses on the procedures of diagnosis and control of plant diseases. ○ Ability to describe the main characteristics and life cycles of the main taxonomic groups of phytopathogenic fungi. • <i>Communication skills</i> <ul style="list-style-type: none"> ○ Ability to explain in exhaustive way, with appropriate words, richness of conceptual connections and examples, aetiology, aetiology, symptomatology, epidemiology, diagnosis, and basic management of plant diseases as well as the biological characteristics of the main phytopathogenic fungi. • <i>Learning ability</i> <ul style="list-style-type: none"> ○ Ability to apply acquired knowledge and skills for problem solving in various operative situations.
Final exam and grading criteria	<p>The final mark is given out of thirty. The exam is considered passed when the grade is greater than or equal to 18. The final mark will consider the theoretical and practical knowledge acquired, the ability to apply the knowledge, autonomy of judgment, communication skills and on the ability to integrate the acquired knowledge in a project work. The evaluation of the student is based on criteria previously fixed and reported in the Annex A of the Didactic Regulation of the Bachelor Course in Agricultural Sciences and Technologies.</p>
Further information	
	.