

COURSE OF STUDY: Agricultural Science and Technology (curriculum Rural System Management – L25 - STA)

ACADEMIC YEAR: 2023-2024

ACADEMIC SUBJECT: Plant Pathology

General information	
Year of the course	3 rd year
Academic calendar (starting and ending date)	II semester – 2024 February 26th – June 14th (Pause 2024 April 22 nd – May 3 rd , for midterm exam)
Credits (CFU/ETCS):	6
SSD	AGR/12 – Plant Pathology
Language	Italian (English will be used when required if foreign students will attend the course and mainly in the didactic material)
Mode of attendance	Not mandatory but suggested

Professor/ Lecturer	
Name and Surname	Stefania POLLASTRO
E-mail	stefania.pollastro@uniba.it
Telephone	080 5442910 – 3391855984
Department and address	Department of Soil, Plant and Food Sciences - first plexus, Plant Pathology Section, Third floor room n.1
Virtual room	Teams platform entry code jwtglo
Office Hours (and modalities: e.g., by appointment, on line, etc.)	Official visiting hours in presence: 9.00-13.00 from Monday to Friday according to an established appointment requested by phone or e-mail. Tutoring could be also on e-learning platforms (Teams) at different times by appointment. Other tutoring methods can be defined on demand.

Work schedule			
Hours			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
150	32	28	75
CFU/ETCS			
6	4	3	6

Learning Objectives	The course aims to provide knowledge on biotic agents (fungi, bacteria, viruses and virus-like) and abiotic, as well as on the biology of causative agents, symptoms, epidemiology, mycotoxin contamination, and diagnosis of diseases affecting the main Mediterranean crops. In addition, it provides basic knowledge in crop protection.
Course prerequisites	Basic knowledge on biology, botany, agronomy and crop production, entomology.

Teaching strategies	The course topics will be treated with the help of <i>powerpoints</i> , working groups, study-cases, the critical analysis of scientific papers and with the support of external experts with seminar activities. Classroom, laboratory, and field exercises will be used in transferring competence on plant pathology. The self-
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	<p>direction, teamwork, self-assessment, and the use of smart technologies will be promoted.</p> <p>For foreign students (LLP-Erasmus, etc.), teaching material will be supplied in English, and the tutoring will be done in English.</p> <p>For students with disabilities and SLD, the teacher will adjust the teaching methods and teaching materials to the specific learning need.</p> <p>E-learning using public (eg Teams) platforms can be used, on demand as additional tutoring activities for working students, athletes and students with babies, as well as front-office activity</p>
Expected learning outcomes in terms of	Expected learning outcomes, knowledge and ability are indicated for each Dublin Descriptor (DD) according to the ones reported in the Art.4 of the Didactic Regulation of the bachelor's degree course Agricultural Science and Technology
DD1 - Knowledge and understanding on:	<ul style="list-style-type: none"> ○ Knowledge and understanding the main topics of plant pathology ○ Knowledge and understanding of main biological characteristics of biotic (phytopathogenic fungi, bacteria, virus and virus-like organism) and abiotic agents responsible of diseases of the main Mediterranean crops ○ Knowledge and understanding of diseases, symptomatology, plant-pathogen interactions, disease epidemiology also according to the knowledge of the disciplines of plant production. ○ Knowledge and understanding of the main interaction events between causal agent, host and environmental condition. ○ Knowledge and understanding of the main diagnostic tools in plant pathology. ○ Knowledge and understanding of the main aspects of mycotoxin contamination of food and feeds. ○ Knowledge and understanding of the basic principles of plant protection regarding integrated pest management and organic agriculture.
DD2 - Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ Ability to identify the causal agents of the main disease of Mediterranean crops protection. ○ Ability to evaluate the damages caused by abiotic and/or biotic agents. ○ Ability to manage the main methods in plant protection. ○ Applying Knowledge and understanding for defining a diagnostic approach in the field and/or in the laboratory.
Soft skills (DD3-DD5)	<ul style="list-style-type: none"> ● DD3 - Making informed judgments and choices At the end of the course, the students will be able to <ul style="list-style-type: none"> ○ understand the phenomena underlying the diseases, their spreading and harmfulness and their sustainable management. ○ understand the biological characteristics of the main taxonomic groups of plant pathogens using information in the decisional process. ● DD4 Communicating knowledge and understanding At the end of the course, the students will be able to <ul style="list-style-type: none"> ○ communicate in oral and written forms using technical language, ○ participate to multidisciplinary working groups ○ communicate the reasons for the choices made on the process adopted on a technical and economic level and on a human and ethical levels ● DD5 Capacities to continue learning At the end of the course, the students will be able to <ul style="list-style-type: none"> ○ improve his/her proper knowledge consulting scientific and technical papers and websites to deepen and update his/her knowledge on diagnostic for plant pathogens ○ critically analyze the contents of presentations and communications in

	<p>technical and scientific meetings</p> <p>Expected learning outcomes, as knowledge and ability, are reported in the Art.4 of the Didactic Regulation of the bachelor's degree course Agricultural Science and Technology (expressed by European Descriptors)</p>
Syllabus	
Content knowledge	<p>Didactic</p> <p>Presentation of the course and brief history of Plant pathology</p> <p>Definition of disease, their economic importance and pathometry</p> <p>Classification of plant diseases</p> <p>Main morphological and functional plant alterations (plant modifications, alterations of cells and tissues, organs falling, withering, wilting, issuance of gums and resins, pathogens fructification, alterations of: photosynthesis, respiration, transport of carbohydrates, phenolic metabolism, and water balance).</p> <p>Diagnosis of plant diseases</p> <p>Mechanisms used by pathogen to attack</p> <p>Mechanisms of passive and active resistance of the plant to disease</p> <p>Epidemiology (influence of environment on the development of plant diseases, the pyramid of the disease, environmental factors, the host, the pathogen, farming practices that favor the development of epidemics, estimates of epidemics)</p> <p>Overview of integrated and organic agriculture protection</p> <p>Mycotoxicology</p> <p>Main biotic factors responsible for plant diseases: fungi, bacteria, viruses, viroids and phytoplasma</p> <p>Outline of major abiotic factors: abnormal lighting conditions, water, thermal, atmospheric composition, meteoric adversity, nutritional imbalances, injuries, phytotoxicity</p> <p>Fungal diseases: case studies on grapes, olives, citrus, vegetables, cereals, artichoke, stone fruit, strawberry, bean and postharvest</p> <p>Bacterial diseases: case-studies on olives, citrus, grapevine, stone fruits, strawberry, strawberry, vegetables</p> <p>Viruses, phytoplasmas and non-parasitic alterations: case studies on vegetable, grapevine, stone fruit, citrus</p> <p>Laboratory, field and class practices, working group</p> <p>Observations of phytopathological samples, observation of microscopic preparations, damage assessment, first approaches to diagnostic techniques; group activities, critical analysis, comparison with experts, researchers and technicians</p>
Texts and readings	<ul style="list-style-type: none"> • Agrios G. (2005) Plant Pathology. 5th Edition. Academic Press, New York • Janse J. D. (2006) Phytobacteriology: Principles and Practice. CABI • Strange R. (2003) Introduction to Plant Pathology. Wiley • Scientific papers supplied by the professor
Notes, additional materials	<p>Scientific paper supplied by the professor</p> <p>Materials in English are additional and can be reference texts for incoming international students</p> <p>Scientific papers supplied by the professor</p> <p>Websites (Examples)</p> <ul style="list-style-type: none"> • http://bugs.bio.usyd.edu.au/learning/resources/PlantPathology/ • http://erec.ifas.ufl.edu/plant_pathology_guidelines/index.shtml • http://issuu.com/scisoc/docs/43818/1

	<ul style="list-style-type: none"> • http://ohioline.osu.edu/hyg-fact/3000/ • http://www.apsnet.org/edcenter/intropp/LabExercises/Pages/Cytology.aspx • http://www.apsnet.org/edcenter/instcomm/TeachingArticles/Pages/TeachingPlantDiseaseDiagnosis.aspx • http://www.plantpath.wisc.edu/PDDCEducation/MasterGardener/General/Slide1.htm
Repository	<p>Powerpoints are not usable as learning material but can help the student during own study and in the using of suggested materials (Book, scientific papers, website).</p> <p>These together with the works prepared by the students, bibliographic reviews and anything deemed useful are available on the teams platform, access code jwtglllo in the folder identified with AA2023-2024, starting from the beginning of the didactic activity, and it will remain available to students even beyond the end of the academic year of reference</p>

Assessment	
Assessment methods	<p>As reported in the Teaching Regulations of the bachelor's degree course STA (Art. 4 and annexes 1 and 2) the exam consists of an oral exam, with the presentation of an application project (project work) on the topics developed during the theoretical and practical lessons exercises in the classroom, in the field and in the laboratory and in the resolution of a case study.</p> <p>Only the students enrolled in the academic year during which this module is provided, can have a midterm exam during the time of teaching. (pause time 22/04/2024 - 3/05/2024). The result of it remains valid for the whole academic year and concurs to the final evaluation of the student (in proportion to the ECTS evaluated during the midterm exam).</p> <p>The exam, as well the midterm exam, consists of an oral test, including the presentation of an application project, with questions related to the lectures and visits, such as reported in the Didactic Regulation of the bachelor's degree course STA (art.4) and in the syllabus (annex 1). The exam consists of four questions and discussing his own project work. Overall, three questions will be asked, and each student will also have to discuss the work carried out independently (project work) which cannot exceed 7 minutes in the presentation.</p> <p>If the midterm exam is taken, the assessment of the profit exam is expressed as an average between the mark given on the exemption and the profit exam.</p> <p>For Foreign students the midterm exam as well as the exam could be in English, and if, required as written test articulated as detailed before.</p>
Assessment criteria	<p>For each expected learning outcome indicated above, it is detailed below what the student is expected to know or be able to do and at what level in order to demonstrate that a learning outcome has been achieved and at what level</p> <ul style="list-style-type: none"> • Knowledge and understanding <ul style="list-style-type: none"> ○ Ability to understand and describe the main biological characteristics of biotic causal agents (fungi, bacteria, virus and virus-like) ○ Ability to describe the etiology, epidemiology, symptomatology, plant-pathogen interactions, and diagnosis of diseases of Mediterranean crops. ○ Ability to understand and describe phenomena due to biotic or abiotic factors. • Applying knowledge and understanding <ul style="list-style-type: none"> ○ Ability to recognize and understand the phytopathological cases

	<ul style="list-style-type: none"> ○ Ability to define the 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. ○ Ability to understand and apply the regulations in force ● Autonomy of judgment <ul style="list-style-type: none"> ○ assessment of the ability to analyze a phytopathological study case suggesting the appropriate solution. ● Communicating knowledge and understanding <ul style="list-style-type: none"> ○ evaluation of the personal ability to communicate in oral form using technical language, to participate to multidisciplinary working groups. ● Communication skills <ul style="list-style-type: none"> ○ ability to organize the acquired knowledge for educational-training purposes as well as for technical reports. ● Capacities to continue learning <ul style="list-style-type: none"> ○ Ability to apply acquired knowledge and skills for problem solving in various operative frames in plant pathology.
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 such as reported in the Art.4 of the Didactic Regulation of the Bachelor's degree Course STA.</p>
Further information	