

## **COURSE OF STUDY** *Bachelor Course in Agricultural Sciences and Technologies*

### *Curriculum Plant Production and Crop Protection*

#### **ACADEMIC YEAR** *2023-2024*

#### **ACADEMIC SUBJECT** *Plant Virology – Virologia Vegetale; Module of Integrate Course in Plant Pathology II (6 ECTS)*

<b>General information</b>	
Year of the course	<i>III year</i>
Academic calendar (starting and ending date)	<i>II semester (26-02-2024 – 14-06-2024)</i>
Credits (CFU/ETCS):	<i>3</i>
SSD	<i>Plant Pathology - AGR/12</i>
Language	<i>Italian</i>
Mode of attendance	<i>Strongly recommended</i>

<b>Professor/ Lecturer</b>	
Name and Surname	<i>Tiziana Mascia</i>
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Department and address	<i>DISSPA – Plant Pathology section - Second floor</i>
Virtual room	<i>Teams: Tiziana Mascia – tiziana.mascia@uniba.it</i>
Office Hours (and modalities: e.g., by appointment, on line, etc.)	<i>Please, contact the teacher via e-mail. Tutoring could be also on e-learning platforms.</i>

<b>Work schedule</b>			
<b>Hours</b>			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
<i>75</i>	<i>16</i>	<i>14</i>	<i>45</i>
<b>CFU/ETCS</b>			
<i>3</i>	<i>2</i>	<i>1</i>	

<b>Learning Objectives</b>	<i>Provide knowledge and tools for the diagnosis and identification of virus and virus-like pathogens based on disease symptoms and epidemiology of pathogens. Provide advanced knowledge and professional skills for crop defense against viruses and virus-like pathogens, through the application of control measures.</i>
<b>Course prerequisites</b>	<i>Plant Biology</i>

<b>Teaching strategy</b>	<i>The lectures will be delivered by frontal teaching. The lessons will be presented through PC assisted tools (PowerPoint presentations and short movies) and classroom exercises useful for the application of knowledge.</i>
<b>Expected learning outcomes in terms of</b>	
<b>Knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>○ Know and understand the basic aspects of plant virology</li> <li>○ Know and understand the biological, eco-epidemiological and morphological characteristics of plant viruses and viroids</li> <li>○ Know and understand the main aspects of pathogenesis and induction of</li> </ul>

	<p>symptoms through virus or viroid and plant interactions</p> <ul style="list-style-type: none"> <li>○ Know and understand the basic methodologies used for detection and identification of viruses and viroids</li> <li>○ Know and understand the basic aspects of virus and viroid control</li> </ul>
<b>Applying knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>○ Ability to recognize virus and viroid-induced plant diseases based on disease symptoms</li> <li>○ Ability to detect asymptomatic viral and viroidal diseases based on the results of NGS sequencing</li> <li>○ Ability to adopt the most appropriate control methods for limiting endemic, emerging and quarantine viruses and viroids</li> </ul>
<b>Soft skills</b>	<ul style="list-style-type: none"> <li>• <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> <li>○ Ability to establish a reliable relationship between etiological agent and disease</li> <li>○ Ability to critically interpret the results of laboratory diagnostic tests, highlighting strengths and weaknesses</li> <li>○ Ability to formulate a strategy for the sustainable control of viruses and viroids</li> </ul> </li> <li>• <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Ability to describe, in oral and written form, the biological, epidemiological and biomolecular characteristics of viruses and viroids and modern and sustainable approaches for their detection, identification and control.</li> <li>○ Ability to discuss critically with specialists and non-specialists about the possibilities offered by modern plant virology for the containment and eradication of viruses and viroid</li> </ul> </li> <li>• <i>Capacities to continue learning</i> <ul style="list-style-type: none"> <li>○ Ability to update and strength own knowledge on the characteristics and control possibilities of viruses and viroids through the consultation of international scientific literature or databases</li> </ul> </li> </ul>
<b>Syllabus</b>	
<b>Content knowledge</b>	<p><i>Frontal teaching:</i></p> <ul style="list-style-type: none"> <li>• <i>Presentation of the course and learning verification methods</i></li> <li>• <i>Definition of virus, species and viral quasispecies. Definition of viroid</i></li> <li>• <i>Distinctive features between animal and plant viruses</i></li> <li>• <i>Structure of virus particles. Viroid structure</i></li> <li>• <i>Principles of taxonomy and nomenclature of plant viruses and viroids</i></li> <li>• <i>Organization and expression of virus and viroids genome</i></li> <li>• <i>Method of transmission of plant viruses and viroids</i></li> <li>• <i>Diagnosis and identification of viruses and viroids with serological methods and with methods based on the characteristics of nucleic acids.</i></li> <li>• <i>Control of virus and viroid-induced diseases in relation to endemic, emerging and quarantine entities.</i></li> <li>• <i>Notes on transgenesis, cisgenesis and genome editing for the control of diseases induced by viruses and viroids</i></li> <li>• <i>Main diseases of viruses and viroids on Mediterranean crops of tomato, potato, cucurbitaceae, grapevine, citrus, stone fruits.</i></li> </ul> <p><i>Classroom demonstrations:</i></p> <ul style="list-style-type: none"> <li>• <i>Transmission electron microscopy</i></li> <li>• <i>Transmission, maintenance and purification of plant viruses</i></li> <li>• <i>Serological identification</i></li> <li>• <i>Molecular hybridization, end-point PCR, real-time PCR, NGS sequencing</i></li> <li>• <i>Sanitation from viral infections through meristem tip culture, thermotherapy and cryotherapy.</i></li> </ul>

<b>Texts and readings</b>	<ul style="list-style-type: none"> <li>• Notes from lectures</li> <li>• power-point files used during lectures</li> <li>• Elementi di Virologia Vegetale, Giunchedi L. Gallitelli D. Conti M., Martelli G.P (2007), Piccin Editore</li> <li>• Plant Virology 5th Edition, Hull R. (2014), Academic Press</li> <li>• Viroids and Satellites, Hadidi A, Flores R. Randles J., Palukaitis P. (2017) Academic Press</li> <li>• Plant Pathology 5th Edition, Agrios G. (2005) Academic Press</li> <li>• Websites: <a href="https://talk.ictvonline.org/taxonomy/">https://talk.ictvonline.org/taxonomy/</a> <a href="https://www.eppo.int/">https://www.eppo.int/</a> <a href="https://viralzone.expasy.org/">https://viralzone.expasy.org/</a></li> </ul>
<b>Notes, additional materials</b>	In-depth learning is encouraged by consulting texts in English.
<b>Repository</b>	<i>The teaching material will be available in the Class Teams. The Teams code of the course will be provided at the beginning of the course attendance.</i>

<b>Assessment</b>	
Assessment methods	<i>The assessment of the knowledges acquired and the ability to apply them to practical problems will take place through an oral exam. Only the students enrolled in the academic year during which this module is provided, can have a midterm exam during the time of teaching. 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).</i>
Assessment criteria	<ul style="list-style-type: none"> <li>• <i>Knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Ability to organize knowledge on the characteristics of viruses and viroids</li> <li>○ Ability to organize knowledge regarding the detection, characterization and identification of viruses and viroids</li> </ul> </li> <li>• <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Ability to correctly describe plant diseases induced by viruses or viroids, defining their possibilities and sustainable control methods</li> </ul> </li> <li>• <i>Autonomy of judgment</i> <ul style="list-style-type: none"> <li>○ Interpret and critically describe the application of modern methods of detection, characterization and identification of viruses and plant viroids</li> </ul> </li> <li>• <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Communication with appropriate language, correct use of scientific terms</li> </ul> </li> <li>• <i>Communication skills</i> <ul style="list-style-type: none"> <li>○ Ability to establish links between the different topics covered in the course</li> </ul> </li> <li>• <i>Capacities to continue learning</i> <ul style="list-style-type: none"> <li>○ Ability to apply the acquired knowledge to specific case studies concerning phytoviruses and viroids, within different application contexts (commercialization, transboundary movement of plants and seeds, organic farming)</li> <li>○ Ability to use current studies and consultation tools for scientific literature and phytosanitary directives in English</li> </ul> </li> </ul>
Final exam and grading criteria	<i>The evaluation is awarded out of thirty, with the possibility of laude, based on autonomy of judgment and student's ability. The exam is passed when the final evaluation is greater than or equal to 18/30.</i>
<b>Further information</b>	
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DEGLI STUDI DI BARI  
ALDO MORO

DISSPA – DIPARTIMENTO DI  
SCIENZE DEL SUOLO, DELLA  
PIANTA E DEGLI ALIMENTI

