

General Information	
Academic subject	Integrated course Plant Pathology II Module Plant Virology
Degree course	Bachelor Course in Agricultural Sciences and Technologies
Curriculum	Vegetable production and Plant protection
ECTS credits	3
Compulsory attendance	No
Language	Italian

Subject teacher	Name Surname	Mail address	SSD
	Roberta Spanò	roberta.spano@uniba.it	AGR/12

ECTS credits details			ETCs
Basic teaching activities	Plant Virology		lectures 2 lab 1

Class schedule	
Period	second semester Academic Year 2021/2022
Year	Third
Type of class	Lectures and/or E-learning using public platforms (e.g. TEAMS), Classroom demonstrations

Time management	
Hours	75
In-class study hours	30
Out-of-class study hours	45

Academic calendar	
Class begins	March 1st 2022
Class ends	June 17 <sup>th</sup> 2022

Syllabus	
Prerequisites/requirements	Plant Biology
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in A4a, A4b, A4c tables of the SUA-CdS)	<p><i>Knowledge and understanding</i></p> <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 symptoms through virus or viroid and plant interactions</li> <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> <p><i>Applying knowledge and understanding</i></p> <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> <p><i>Making informed judgements and choices</i></p> <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> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>• Ability to describe, in oral and written form, the biological, epidemiological</li> </ul>

	<p>and biomolecular characteristics of viruses and viroids and modern and sustainable approaches for their detection, identification and control.</p> <ul style="list-style-type: none"> <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> <p><i>Capacities to continue learning</i></p> <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> <p>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).</p>
Contents	<p><b>Frontal teaching and group activities</b></p> <ul style="list-style-type: none"> <li>• Presentation of the course and learning verification methods</li> <li>• Definition of virus, species and viral quasispecies. Definition of viroid</li> <li>• Distinctive features between animal and plant viruses</li> <li>• Structure of virus particles. Viroid structure</li> <li>• Principles of taxonomy and nomenclature of plant viruses and viroids</li> <li>• Organization and expression of virus and viroids genome</li> <li>• Method of transmission of plant viruses and viroids</li> <li>• Diagnosis and identification of viruses and viroids with serological methods and with methods based on the characteristics of nucleic acids.</li> <li>• Possibility of controlling virus and viroid-induced diseases in relation to endemic, emerging and quarantine entities.</li> <li>• Notes on transgenesis, cisgenesis and genome editing for the control of diseases induced by viruses and viroids</li> <li>• Main diseases of viruses and viroids on Mediterranean crops of tomato, potato, cucurbitaceae, legumes, grapevine, citrus, stone fruits.</li> </ul> <p><b>Classroom demonstrations</b></p> <ul style="list-style-type: none"> <li>• Transmission electron microscopy</li> <li>• Transmission, maintenance and purification of plant viruses</li> <li>• Sanitation from viral infections through meristem tip culture, thermotherapy and cryotherapy</li> <li>• Molecular hybridization, end-point PCR, real-time PCR, NGS sequencing</li> <li>• Serological identification.</li> </ul>
Course program	
Bibliography	<p>Notes from lectures power-point files used during lectures Elementi di Virologia Vegetale, Giunchedi L. Gallitelli D. Conti M., Martelli G.P (2007), Piccin Editore Plant Virology 5th Edition, Hull R. (2014), Academic Press Viroids and Satellites, Hadidi A, Flores R. Randles J., Palukaitis P. (2017) Academic Press Plant Pathology 5th Edition, Agrios G. (2005) Academic Press</p> <p><b>Examples of websites</b> <a href="https://talk.ictvonline.org/taxonomy/">https://talk.ictvonline.org/taxonomy/</a></p>
Notes	In-depth learning is encouraged by consulting texts in English
Teaching methods	Slides, scientific movies, Classroom demonstrations
Assessment methods (indicate at least the type written, oral, other)	The verification of the learning outcomes relating to the individual indicators will take place during the classroom demonstrations and during the final oral exam. In particular, the student is expected to correctly understand the question posed and provide in a concise but with adequate arguments the details necessary to formulate the correct answer, also through links with similar topics covered in the teaching program.

<p>Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and how many levels of achievement there are.</p>	<p><i>Knowledge and comprehension ability</i></p> <ul style="list-style-type: none"> <li>• Understand and correctly answer questions regarding the general part on the characteristics of viruses and viroids</li> <li>• Understand and correctly answer the questions p regarding the detection, characterization and identification of viruses and viroids</li> </ul> <p><i>Knowledge and applied comprehension ability</i></p> <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> <p><i>Autonomy of judgement</i></p> <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> <p><i>Communication skills</i></p> <ul style="list-style-type: none"> <li>• Communication with appropriate language, correct use of scientific terms and ability to establish links between the different topics covered in the course</li> </ul> <p><i>Learning ability</i></p> <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>
<p>Further information</p>	<p><b>Visiting hours</b> Please, contact the teacher via e-mail. Tutoring could be also on e-learning platforms.</p>