General Information	
Academic subject	**Physiological plant pathology (module of I.C. Plant physiology and physiopathology)**
Degree course	**Master degree Plant Medicine (LM69)**
Curriculum	
ECTS credits	3
Compulsory attendance	No
Language	Italian (English will be used when required for foreign students into didactic material)

Subject teacher	Name Surname	Mail address	SSD
	Giovanni L. Bruno	giovanniluigi.bruno@uniba.it	AGR 12

ECTS credits details	Area		
Basic teaching activities			

Class schedule	
Period	First semester
Year	First year
Type of class	Lectures, 2 ECTS (16 hours). Laboratory and field classroom, working groups, study case, and transferring of stakeholders' experiences 1 ECTS (14 hours) E-learning using public (eg Teams) and dedicated (Agripodcast) platforms can be used, on demand as learning facilities for students with disabilities and for working students, student athletes and students with babies.

Time management	
Hours	75
In-class study hours	30 (16 Lectures + 14 Lab & field cl.)
Out-of-class study hours	45

Academic calendar	
Class begins	2020 September 28
Class ends	2021 January 22

Syllabus	
Prerequisites/requirements	Knowledge of Physiology and plant pathology requests for admission to the Master course.
Expected learning outcomes	*Knowledge and understanding on:* ○ Knowledge of the main morphological, biochemical, physiological, cytological, and genetic alterations caused by pathogens in plants and methodologies for studying; ○ Understanding of virulence factors and molecules-signal produced by plant-pathogens and their effects on physiological functions of plants; ○ Knowledge of principal molecules synthesized by the plant as a response to the presence of pathogen; ○ Knowledge about biomolecules produced by plant-pathogenic fungi and bacterial used in agriculture. *Applying knowledge and understanding* on:

	○ Capacity to identify the type of stress which a plant is subjected, and the mechanisms associated with it; ○ Capacity to associate pathogen-virulence-factors and plant-defence-molecules at the different stages of the infection process; ○ Knowledge about biomolecules applied as chemicals. *Making informed judgments and choices:* ○ Ability to analyse plant-pathogen interaction as physiological decayed pathway. *Communicating knowledge and understanding* ○ Ability to discuss critically the physio-pathological bases of plant-pathogen interaction-environment-resident organisms. *Capacities to continue learning* ○ recognize the physiological basis of plant-pathogen interaction; ○ suggest the virulence factors used by plant-pathogens and the defences carried out by the infected plant. Expected learning outcomes, as knowledge and ability, are reported in the annex A of the Didactic Regulation of the course Plant Medicine (expressed by European Descriptors)
Contents	Refer on: disease, pathogenesis and disease cycle. Cytological, morphological, biochemical, physiological and genetic alterations caused by pathogens in plants and methodologies of study. Pathogen virulence factors (enzymes, microbial toxins, exopolysaccharides, growth regulator substances, plasmids, suppressors of plant defence response). Signal-molecules produced by the pathogen before, during and after plant-pathogen-interaction. Production, perception and transduction of biochemical signals in plant defence. Activation of metabolic cycles involved in the resistance. Phenolic metabolism, phytoalexins. Induction of chemical defences. Study of molecular mechanism in the plant disease. Plant-pathogen-environment-interactions in order to prevent or contrast diseases development; Biomolecules produced by plant-pathogenic bacteria or fungi useful as chemicals.
Course program	
Bibliography	- Notes on lectures distributed during the course. - Matta A., Pennazio S., 1984 - Elementi di fisiopatologia vegetale, Pitagora. - Stacey G., Mullin B., Gresshoff P.M. (Eds.), 1997 - Biology of plant-microbe interactions. International Society for molecular plant-microbe interactions, APS. - Keen N. T., Mayama S., Leach J.E., Tsuyumu S. (Eds.), 2001 - Delivery and perception of pathogen signals in plants. APS. - Prell H.H., Day P.R., 2000 - Plant-Fungal pathogen Interaction: A classical and molecular view. Springer-Verlag.

	- Buchanan B.B., Gruissem W., Jones R.L., 2003 - Biochemistry and Molecular Biology of Plants (cap. 20-21-24), ASPP.
Notes	None
Teaching methods	Lectures will be presented by PowerPoint presentations and laboratory experiments
Assessment methods	The exam, unique, total and collegial for the I.C. Plant Physiology and Physiopathology, consists of an oral test on the subjects of both modules "Plant physiology" and "Physiological Plant pathology" as reported in the Didactic regulation of the Master in "Plant medicine" (article 9) and in the syllabus (Annex A). The evaluation of the student's preparation is based on established criteria, as detailed in Annex A of the study regulations of the master's degree program. For students enrolled in the academic year in which the I.C. is taught, there is an intermediate exemption oral test. This exemption regarding the subjects of lectures and laboratory classes held in the period before the test itself (about half of the program of each module). The exemption test for Physiopathology module consists at least of two oral questions on the subjects of lectures and laboratory classes held in the period before the test itself. The positive results of exemption test of both modules contribute to the evaluation of the examination of I.C. and are valid for one academic year. Exemption test and final exam are expressed in thirtieths. For students fit to the exemption test, the final oral exam will point on topics of lectures and laboratory classes held in the subsequent period of the test itself. For Physiopathology module at least of two oral questions will be give. For these students, the assessment of the exam is expressed as an average between exemption test and final exam. For students who have NOT passed/supported the exemption test, the exam for the physiopathology module consist at least of four questions. For foreign students the exam can be done in English.
Evaluation criteria	• *Knowledge and understanding* ○ Describe the main alterations caused by pathogens in diseased-plants and the appropriate methodologies of study; ○ Describe the plant-pathogen-environment interactions in terms of virulence factors, molecules-signal, biochemical signals and their physio-pathological aspects and applications in agriculture. • *Applying knowledge and understanding* ○ Describe the plant-pathogen-environment interactions from a phyto-pathological point of view. • *Autonomy of judgment* ○ Express reasonable assumptions on Plant-pathogen-environment interaction in terms of changed physiological functions. • *Communicating knowledge and understanding* ○ Express reasonable assumptions on Plant-pathogen-environment interaction in terms of changed physiological functions. • *Communication skills* ○ Describe with appropriate language the physiopathology of plant-pathogen-environment interaction.

	○ Organize the acquired knowledge in form of didactic presentation and to articulate it for didactic purposes. • *Capacities to continue learning* ○ Learning of knowledge of this module occurs during lectures and laboratory classroom, oral exemption test and final oral exam, testing and self-assessment-individual test learning available on ATutor and/or Agripodcast platform of asynchronous teaching ○ A useful parameter is the time-lapse between the course frequency and the exam.
Further information	**Visiting hours** Official visiting hours: Monday to Friday according to an established appointment requested by phone or e-mail. Tutoring could be also on e-learning platforms.