

COURSE OF STUDY *Master course in Plant Medicine (LM69)*

ACADEMIC YEAR 2023-2024

ACADEMIC SUBJECT *Applied agricultural entomology*

General information	
Year of the course	I year
Academic calendar	II semester (26.02.2024 – 14.06.2024)
Credits (ETCS):	6
SSD	General and applied entomology - AGR/11
Language	Italian
Mode of attendance	Not mandatory but highly suggested

Professor/ Lecturer	
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Virtual room	Teams code for tutoring: keh9f2i
Office Hours	Wednesday, Thursday and Friday from 11.30 am to 1.30 pm, after a request of appointment by mail or phone. Tutoring could be also made through the most common applications.

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	90
ETCS			
E6	4	2	

Learning Objectives	To provide the elements for the characterization of the main Orders of insects as well as knowledge on the main species of phytophagous pests of the most representative crops in the Mediterranean region, and their natural antagonists. In particular, knowledge of the morphology, bio-ethology, monitoring and control of harmful insects will be deepened in order to enable the application of plant protection programs (field and protected crops) that meet the standards of biological and integrated control.
Course prerequisites	General zoological and entomological knowledge

Teaching strategie	The teaching topics will be delivered by face-to-face teaching by offering numerous examples and using Power Point presentations and videos. Students will be accompanied in the acquisition of knowledge with the performance of classroom and laboratory exercise activities with the aim of having them achieve their own autonomy of investigation, observation, evaluation of the material examined and communication of the outcomes of these exercise activities.
Expected learning outcomes in terms of	
Knowledge and understanding on:	<ul style="list-style-type: none"> ○ knowledge and skills necessary for understanding the morphology, bio-ethology and ecology of major phytophagous insect species, induced symptoms as well as their antagonists

	<ul style="list-style-type: none"> ○ knowledge of methods and means of monitoring and sampling of phytophagous insects. ○ knowledge of some prediction models of phytophagous insects ○ knowledge and skills necessary for understanding the principles of integrated and biological protection (of crops and plant products) from phytophagous insects and related national and international regulations
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ knowledge and skills necessary for the identification and characterization of major phytophagous insects, also on the basis of induced symptoms, as well as their antagonists through traditional and advanced methods and techniques, including biotechnology ○ knowledge and skills necessary for the implementation of direct and indirect (symptom-based) monitoring programs of major phytophagous insects ○ knowledge and skills needed for the innovative design and management of integrated protection of crops and plant products from major phytophagous insects to improve the quality, quantity, and sanitation aspects of plant production, storability, and marketing
Soft skills	<ul style="list-style-type: none"> • <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> ○ ability to understand the bio-ethological and ecological phenomena that determine the success of phytophagous insects ○ ability to apply corrective interventions that limit the success of phytophagous insects in all production contexts after careful evaluation of production and market variables and with full respect and protection of the environment and consumers • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ ability to transfer knowledge about phytophagous insects, their antagonists, bio-ethological and ecological phenomena that determine their success • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ ability to deepen and update their knowledge regarding phytophagous insects, their antagonists, bio-ethological and ecological phenomena involving them in the context under consideration.
Syllabus	
Content knowledge	<p>Introduction to the teaching course. Classification of insects. Characteristics of the main Orders of insects. Morphological, bio-ethological and ecological characterization, and methods of monitoring, sampling and control of the main phytophagous taxa of the following types of crops:</p> <ul style="list-style-type: none"> - Drupaceous: thrips, <i>Monosteira unicastata</i>, brown marmorated stink bug, aphids, scale insects, <i>Anarsia lineatella</i>, Mediterranean fruit and cherry fly, <i>Drosophila suzukii</i>, <i>Capnodis tenebrionis</i>; - Citrus: whiteflies, aphids, <i>Icerya purchasi</i>, mealybugs, scale insects, <i>Phyllocnistis citrella</i>, Mediterranean fruit fly; - Vegetables: whiteflies, <i>Tuta absoluta</i>, tomato bollworm, leafminers, potato beetle, <i>Liriomyza</i> spp.; - Olive tree: <i>Saissetia oleae</i>, leopard moth, olive fly, <i>Otiiorhynchus cribricollis</i>; - Grapevine: thrips, <i>Lobesia botrana</i>, <i>Cryptoblabes gnidiella</i>, mealbugs. <p>Exercises - Literature searches; online keys; paper and online study materials. Microscopy and tools.</p> <p>Methods of substrate sampling; sample collection, temporary and permanent storage. Techniques for setting up preparations for recognition. Recognition of insects and associated symptoms. Breeding of some species for the purpose of studying bio-ethological cycle and symptomatology.</p>

Texts and readings	<p>- Lecture notes from lectures and lecturer's handout Study outlines: presentations and other lecture materials distributed during the course of lectures</p> <p>For further study:</p> <ul style="list-style-type: none"> • Pollini A., 1998. Manuale di Entomologia applicata. Edagricole, Bologna. • Masutti L. Zangheri S., 2001. Entomologia generale e applicata. Cedam, Padova. • Chinery M., 1997. Atlante di Entomologia. Gruppo D'Adamo Editore, Padova.
Notes, additional materials	<p>The texts given for further study are adversely affected by regulatory changes in control practices. Currently, there is no updated all-inclusive text. Attendance at lectures allows you to draw on the latest news and changes in this regard provided by the lecturer during teaching.</p>
Repository	<p>Students will be able to obtain copies of presentations used during lectures, including tutorials when they involve lab application protocols, by accessing the MTeams platform. Specific papers and other study materials (reviews, free-for-all texts, movies, etc.) will also be made available on the same platform.</p>

Assessment	
Assessment methods	<p>The teaching includes a midterm learning verification (not compulsory and concerning only students enrolled in the first year of the course), completion of the exam at the end of the teaching (only for students who have successfully taken the midterm), and the profit exam (for all students who have not taken a midterm). The mid-term verification will cover the topics covered up to half of the teaching while the completion of the verification will cover the remaining topics. The final assessment will be given by the average of the grades. The verification will be carried out in the form of an interview regarding the topics developed during the theoretical and theoretical-practical lectures in the classroom and laboratory, as stated in the Didactic Regulations of the Master of Science Degree Course in Plant Medicine (Art. 9) and in the study plan (Annex A), proportionate to the number of ECTS assessed.</p> <p>A minimum of four questions in total will be asked including one on the introductory part. Preparation of a thematic entomological box with at least thirty insects is required.</p> <p>The evaluation of the student's preparation is based on predetermined criteria as detailed in Annex A of the Didactic Regulations of the Master of Science in Plant Medicine Degree Course.</p> <p>The sufficiency will be achieved when the student demonstrates knowledge of the morphology and bio-ethology of insects, distinguishing the taxon to which they belong and the ecological class, performing a context analysis by proposing the most appropriate integrated and biological management practices for the protection of plants and biodiversity conservation for species that have significance in natural and biological control.</p>
Assessment criteria	<ul style="list-style-type: none"> • <i>Knowledge and understanding</i> <ul style="list-style-type: none"> ○ describe the morphological, biological, ecological and ethological characteristics of phytophagous insects, induced symptoms as well as their antagonists ○ describe the main methods and means of monitoring and sampling phytophagous insects ○ describe the main predictive models applied to phytophagous insects

	<ul style="list-style-type: none"> ○ describe and evaluate the principles of integrated protection of crops and plant products from phytophagous insects and related national and international regulations ● <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> ○ be able to identify phytophagous insects as well as their antagonists, including on the induced symptoms ○ be able to prepare a monitoring plan for phytophagous insects ○ be able to design and execute a plan for integrated protection of crops and plant products from phytophagous insects to improve the quality, quantity and sanitation aspects of plant production, storability and marketing ● <i>Autonomy of judgment</i> <ul style="list-style-type: none"> ○ express reasonable hypotheses for intervening on factors that may induce phytophagous insects success ○ evaluate the design and implementation of remedial interventions that limit the success of phytophagous insects in production settings ● <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ comprehensively describe and illustrate, with appropriateness in terms, with rich examples and with connections the aspects that characterize the success of phytophagous insects ● <i>Communication skills</i> <ul style="list-style-type: none"> ○ ability to organize acquired knowledge in the form of presentation and articulation of discourse for didactic-educational purposes ● <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ adapt the basic cognitive tools acquired during the course of education to explain and solve multiple application problems and diverse case studies
Final exam and grading criteria	<p>The evaluation of the midterm/final verification and profit examination is expressed in 30ies, and the examination is considered passed when the grade is greater than or equal to 18. Successful completion of the midterm examination is valid for the academic year. The final grade will be formulated on the basis of the knowledge acquired by the student, the ability to analyze and process possible field situations as well as the potential actions required by the situations addressed during the interview. To achieve a high final grade, the student must have developed autonomy of judgment, adequate argumentation and exposition skills. Honors will be granted in case of clarity and comprehensiveness of exposition, accompanied by a manifest ability to go into depth.</p>
Further information	