General information		
Academic subject	***Chemistry and Biochemistry of Pesticides (module of I.C. Plant Protection)***	
Degree course	*Master Course in Plant Medicine (LM69)*	
Academic Year	*2021/2022*	
European Credit Transfer and Accumulation System (ECTS)		3
Language	*Italian*	
Academic calendar (starting and ending date)	*I semester – September 27th 2021 – January 21st 2022*	
Attendance		

Professor/ Lecturer	
Name and Surname	Matteo Spagnuolo
E-mail	matteo.spagnuolo@uniba.it
Telephone	+39 0805442851
Department and address	*Bari*
Virtual headquarters	*Bari*
Tutoring (time and day)	Monday – Friday 9.00 – 13.00 15.00 – 18.00

Syllabus	
Learning Objectives	*The module aims to provide knowledge about the properties of pesticides and their mechanism of action in the biochemical pathways of target organisms. The transformation of active substances in plants and their fate in the soil environment will be also addressed.*
Course prerequisites	*Knowledge of Chemistry, Plant Biochemistry, Plant Physiology and Soil Chemistry*
Contents	*Registration of pesticides. Principles of toxicology: toxicity towards humans and the environment. Formulation of pesticides. Chemical and functional classification. Mechanisms of action of pesticides. Transport and accumulation of pesticides in plant. Influence of physical-chemical properties on the absorption and translocation of pesticides in plant. Absorption, translocation and mechanisms of action of insecticides. Absorption, translocation and mechanisms of action of herbicides.* *Metabolism of pesticides in plant. Detoxification reactions: red-ox, hydrolysis, conjugation, role of glutathione, glucose and amino acids. Resistance and selectivity of pesticides.* *Fate of pesticides in soil. Diffusion, volatilization and mass transfer. Adsorption of soil components. Transformation: persistence, phototransformation, chemical degradation, microbial and enzymatic degradation, polymerization, oxidative coupling. Chemical and biotechnological processes of soil remediation. Sorption isotherms and analysis of pesticides in soil.* *Analytical methods for the determination of pesticide residues.* *Ecotoxicological assessment of pesticides.*
Books and bibliography	*Notes of the lectures distributed during the course.* *Gennari M., Trevisan M., 2008 - Agrofarmaci. Conoscenze per un uso sostenibile. Gruppo Perdisa Editore/Airplane s.r.l. Bologna.* *Fitogest + - https://fitogest.imagelinenetwork.com/it/agrofarmaci/*
Additional materials	

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars,	Out-of-class study

		field trips)	hours/ Self-study hours
Hours			
30	*16*	*14*	*45*
ECTS			
3	*2*	*1*	

Teaching strategy	
	The lectures will be given with the aid of Power Point presentations, video clips, educational tour in open fields, seminars held by consultants. *Lecture notes and educational supplies will be provided by means of a mailing list or online platforms (i.e.: MSTeams, Dropbox, Google Drive…)*
Expected learning outcomes	
Knowledge and understanding on:	○ Knowledge about the composition and properties of pesticides and their mechanism of action in the biochemical pathways of target organisms. ○ Knowledge on the pesticide interaction with plant and the environment. ○ Knowledge of the Italian and European legislation on pesticides.
Applying knowledge and understanding on:	○ Ability to apply the legislation on the use and commercialization of plant protection products. ○ The student will acquire the competence for a sustainable use of pesticides in crop protection for reducing their environmental impact and for obtaining safe agricultural products.
Soft skills	• *Making informed judgments and choices* ○ Analytical and problem solving skills to independently analyse different technical and market situations in terms of sustainable use of pesticides. • *Communicating knowledge and understanding* ○ Ability to relate to other subjects in a multidisciplinary way on technical, human and ethical issues. • *Capacities to continue learning* ○ Ability to use cognitive tools such as the information technology (IT) and the English language for the continuing self-education.

Assessment and feedback	
Methods of assessment	*A mid-term exam will be held for active students. It will be an oral exam. The maximum grade will be thirty and the minimum for passing the mid-term exam is eighteen. The mid-term grade contribute in the same way with the final exam for the whole grade and will be valid for the whole academic year.* *The final exam, as well as the mid-term exam, consists of an oral test with questions related to the program such as reported in the Didactic Regulation in Plant Medicine (art.9) and in the syllabus (annex A).*
Evaluation criteria	• *Knowledge and understanding* ○ Good knowledge about the composition and properties of pesticides and their mechanism of action in the biochemical pathways of target organisms. ○ Deep knowledge on the pesticide interaction with plant and the environment. ○ Good knowledge of the Italian and European legislation on pesticides,

	• *Applying knowledge and understanding* ○ Very good ability to apply the legislation on the use and commercialization of plant protection products. ○ The student will acquire a very good competence for a sustainable use of pesticides in crop protection for reducing their environmental impact and for obtaining safe agricultural products. • *Making informed judgements and choices* ○ Good analytical and problem solving skills to independently analyze different technical and market situations in terms of sustainable use of pesticides. • *Communicating knowledge and understanding* ○ Good ability to relate to other subjects in a multidisciplinary way on technical, human and ethical issues. • *Communication skills* ○ Ability to organize the acquired knowledge in form of didactic presentation and to articulate it for didactic purposes • *Capacities to continue learning* ○ Ability to use cognitive tools such as the information technology (IT) and the English language for the continuing self-education.
Criteria for assessment and attribution of the final mark	*The student evaluation is obtained by using preset criteria, as reported in the Annex A of the Didactic Guidelines of the Master Degree in Plant Medicine.* *The final grade will be obtained by averaging that of the mid-term, when possible.* *The maximum grade is thirty.*
Additional information	