

COURSE OF STUDY: Master's degree Plant Medicine (LM69)
ACADEMIC YEAR: 2023-2024
ACADEMIC SUBJECT Plant nutrition and soil fertility (3 ETCS) - module of I.C. Plant Physiology and Phytopatology

General information	
Year of the course	<i>Second Year</i>
Academic calendar (starting and ending date)	September 25 th 2023 - January 19 th 2024 (Pause November 13 th -24 th 2023, for midterm exam)
Credits (CFU/ETCS):	3
SSD	<i>Agricultural Chemistry (AGR13)</i>
Language	<i>English</i>
Mode of attendance	No mandatory

Professor/ Lecturer	
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Department and address	Department of Soil, Plant and Food Sciences – Chemistry and Biochemistry Section, First floor room n. 9
Virtual room	Microsoft Teams code:
Office Hours (and modalities: e.g., by appointment, on line, etc.)	From Monday to Friday, 9.00 a.m. to 1.30 p.m., following an established appointment requested by phone, e-mail or Teams.

w1tqjsk

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

Learning Objectives	<i>The course, part of the IC - Plant Physiology and Phytopatology, aims to provide knowledge on the rhizosphere processes for the sustainable management of plant mineral nutrition. Particular emphasis is placed on the improvement of soil quality and the use of biostimulants to reduce the use of chemical fertilizers. Students will be able to adopt innovative techniques for determining the mineral nutritional requirements of plants.</i>
Course prerequisites	Knowledge of Soil Chemistry and Plant Biochemistry request for the admission to the Master course

Teaching strategies	<i>The lectures will be given with the aid of Power Point presentations, video clips, educational tour in open fields and companies, seminars held by consultants, practical exercises in classroom and in laboratory.</i>
Expected learning outcomes in terms of,	
Knowledge and understanding on:	<ul style="list-style-type: none"> ○ Knowledge about the chemical, biochemical, and biological properties of rhizosphere.

	<ul style="list-style-type: none"> ○ Knowledge on the sustainable use of fertilizers for plant nutrition. ○ Knowledge on the physiological properties and sustainable application of biostimulants. ○ Knowledge on the main innovative techniques for assessing the nutritional requirements of plants
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ The student will acquire the competence for a sustainable use of fertilizers for improving the crop nutrition ○ Ability to apply biostimulants for optimizing crop nutrition. ○ Ability to apply the knowledge about the assessment of nutritional requirements of plants.
Soft skills	<ul style="list-style-type: none"> ● <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> ○ Analytical and problem solving skills to independently analyze different technical situations in terms of sustainable use of fertilizers and biostimulants ● <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ Good ability to relate to other subjects in a multidisciplinary way on technical, human and ethical issues. ○ Ability to organize the acquired knowledge in form of didactic presentation and to articulate it for didactic purposes ● <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Ability to use cognitive tools such as the information technology (IT) and the English language for the continuing self-education.
Syllabus	
Content knowledge	<p><i>The importance of the rhizosphere in the nutrient cycle of elements.</i></p> <p><i>Role of mineral elements in the plant physiology.</i></p> <p><i>Production of organic fertilizers from wastes and by-products</i></p> <p><i>Classification and composition of fertilizers</i></p> <p><i>Crop nutrition in organic farming and sustainable farming systems.</i></p> <p><i>Biostimulants: classification, physiological properties and application in sustainable agriculture.</i></p> <p><i>Innovative techniques for the assessment of soil fertility and plant nutrient status.</i></p> <p><i>Soil, water and plant analysis with traditional and innovative techniques</i></p>
Texts and readings	<ul style="list-style-type: none"> ● <i>Personal notes of the lectures and didactic materials distributed during the course.</i>
Notes, additional materials	
Repository	<i>The teaching material is available in the Microsoft Teams Class: Sustainable Clean Soil Strategies 2023 24 (teams code w1tqjsk)</i>
Assessment	
Assessment methods	<p>The exam consists of an oral dissertation on the topics developed during the theoretical and theoretical-practical lectures in the classroom and in the laboratory/open field.</p> <p>Students attending at the lectures may have a middle-term preliminary exam, consisting of an oral test, relative to the first part of the program, which will concur to the final evaluation and will be considered valid for 1 year.</p>
Assessment criteria	<ul style="list-style-type: none"> ● <i>Knowledge and understanding</i> <ul style="list-style-type: none"> ○ Good knowledge about the crop nutrition in organic and sustainable farming systems.

	<ul style="list-style-type: none"> ○ Knowledge about the role of biostimulants for improving the quality of the products and the reduction of the use of fertilizers and pesticides. ○ Knowledge on the main innovative techniques for assessing the soil fertility, the plant nutrient status and the sustainable management of crop nutrition. ● <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> ○ Ability to propose sustainable and innovative techniques aimed at reducing the use of fertilizers and improving soil quality in order to achieve a low environmental impact of the soil-plant-food system. ● <i>Autonomy of judgment</i> <ul style="list-style-type: none"> ○ Good analytical and problem solving skills to analyze independently different technical situations in terms of sustainable use of fertilizers and biostimulants. ● <i>Communication skills</i> <ul style="list-style-type: none"> ○ Good ability to relate to other subjects in a multidisciplinary way on technical, human and ethical issues. ○ Ability to organize the acquired knowledge in form of didactic presentation and to articulate it for didactic purposes ● <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Ability to use cognitive tools such as the information technology (IT) and the English language for the continuing self-education
Final exam and grading criteria	<p>The final mark will consider the theoretical and practical knowledge acquired, the ability to apply the knowledge, autonomy of judgment, communication skills and on the ability to integrate the acquired knowledge in a project work. The evaluation of the student is based on criteria previously fixed such as reported in the Annex A of the Didactic Regulation of the Master Course in Plant Medicine. The final mark is awarded in thirtieths. The exam is passed when the mark is greater than or equal to 18.</p>
Further information	