

COURSE OF STUDY *Plant Medicine - (LM69)*
ACADEMIC YEAR 2023-2024

ACADEMIC SUBJECT *Water management and nutrition in fruit trees, 3 ETCS (part of the integrated course of Agroecosystem Management)*

 LAUREA MAGISTRALE
 MEDICINA DELLE PIANTE
 MASTER DEGREE
 PLANT MEDICINE


General information	
Year of the course	<i>Second year</i>
Academic calendar (starting and ending date)	<i>Second semester (25th September 2024 - 19th January 2024)</i>
Credits (CFU/ETCS):	3
SSD	<i>Arboriculture and Fruitculture (AGR/03)</i>
Language	<i>Italian</i>
Mode of attendance	<i>Not mandatory but recommended</i>

Professor/ Lecturer	
Name and Surname	Pasquale LOSCIALE
E-mail	pasquale.losciale@uniba.it
Telephone	080/5442990
Department and address	<i>Department of Soil, Plant and Food Sciences, University of Bari "Aldo Moro" Via Amendola 165/A, 70126 Bari (Italy)</i>
Virtual room	<i>Teams: pasquale.losciale@uniba.it</i>
Office Hours (and modalities: e.g., by appointment, on line, etc.)	Monday-Friday. Appointment required: by e-mail: pasquale.losciale@uniba.it . Meetings are planned in presence but for particular reasons they can be arranged remotely by Teams platform.

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	<ul style="list-style-type: none"> - <i>To provide knowledge and skills on water and nutrient needing of fruit orchard.</i> - <i>To provide knowledge and skills about how to manage irrigation and fertilization in fruit tree species.</i> - <i>To provide knowledge and skills related the use of sensors and decision support system for monitoring the orchard status.</i> - <i>To provide knowledge and skills related to high efficiency agro-practices aiming at saving water and increasing productivity.</i>
Course prerequisites	<i>It is desirable to have basic knowledge on Pant Biology and Physiology, Agronomy, Fruit tree science and Agro-Chemistry</i>

Teaching strategy	Classroom lectures, classroom experiences (practicum), field and lab activities, case study discussions, seminars held by experts. The course is performed in presence, unless exceptional conditions
Expected learning outcomes in terms of	

<p>Knowledge and understanding on:</p>	<ul style="list-style-type: none"> ○ The relationship existing between tree functionality and its water and nutritional status. ○ The many pedo-climate, hydrologic and physiologic variables used for setting up a program of irrigation and fertilization. ○ Low-input/high-efficiency agro-practices analysed during the class. ○ Basic knowledge for monitoring the orchard by means of sensors (proximal and remote), indices and other technologies linked to Smart Agriculture.
<p>Applying knowledge and understanding on:</p>	<p>Theoretical and practical knowledge on:</p> <ul style="list-style-type: none"> ○ The measure of the main physiological processes determining the product formation. ○ Quantify water and nutrient needing in fruit tree species. ○ The implementation of the low-input/high-efficiency agro-practices in the field. ○ The use of the most widespread orchard monitoring devices and the correct interpretation of aDSS outputs and suggestions.
<p>Soft skills</p>	<ul style="list-style-type: none"> ● <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> ○ Ability to choose and combine the agro-practices, addressed in the class, according to the pedo-climate, the input factors availability, and the productive target to reach. ○ Ability to choose the most appropriate field sensors and aDSS taking into account their strength/weakness points, as well as the real the farm conditions to be faced. ● <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ Ability to communicate and discuss the issues addressed in the class with an appropriate terminology. ● <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Ability to deepen and upgrade the knowledge about the issues addressed in the class.
<p>Syllabus</p>	
<p>Content knowledge</p>	<ul style="list-style-type: none"> ● <i>About the class and educational agreement</i> ● <i>Summary on irrigation variables and some hydrological constants.</i> ● <i>The role water in fruit trees and water relations in the Soil-Plant Atmosphere Continuum.</i> <ul style="list-style-type: none"> ○ <i>Water potential.</i> ○ <i>Stomatal conductance and transpiration.</i> ○ <i>Photosynthesis.</i> ○ <i>Fruit Growth.</i> ○ <i>Water fluxes.</i> ● <i>How much water?</i> <ul style="list-style-type: none"> ○ <i>Water balance.</i> ○ <i>Evapotranspiration approach and related sensors.</i> ○ <i>Soil water content approach and related sensors.</i> ● <i>When to irrigate?</i> <ul style="list-style-type: none"> ○ <i>Irrigation and ecophysiology.</i> ○ <i>Plant Based Irrigation and related sensors.</i> ● <i>Induced water stress strategies</i> <ul style="list-style-type: none"> ○ <i>Deficit Irrigation.</i> ○ <i>Regulated Deficit Irrigation.</i> ○ <i>Partial Rootzone Drying.</i> ● <i>Orchard monitoring and Smart Agriculture.</i> <ul style="list-style-type: none"> ○ <i>Main variables and sensors used for the orchard monitoring.</i> ○ <i>Decision Support System in Agriculture.</i>

	<ul style="list-style-type: none"> • <i>Water-friendly agro practices.</i> • <i>Fertilization in fruit orchard management</i> • <i>Fertilization for plantation, training and production.</i> • <i>How much fertiliser?</i> <ul style="list-style-type: none"> ○ <i>Soil content.</i> ○ <i>Withdraw balance.</i> • <i>When to fertilize?</i> <ul style="list-style-type: none"> ○ <i>Plant based nutrition.</i> • <i>Which way?</i> <ul style="list-style-type: none"> ○ <i>Ground fertilization.</i> ○ <i>Fertigation.</i> ○ <i>Leaf nutrition.</i>
Texts and readings	<p>- Lecture notes, presentations, scientific papers and other didactic material will be provided by the teacher.</p> <p>- Selected chapters of the book: <i>Principles of Modern Fruit Science. Sansavini et al (ed). 2019. ISHS</i></p>
Notes, additional materials	<i>Scientific papers, App etc. provided during the course</i>
Repository	

Assessment	
Assessment methods	The evaluation tests related to this module of the Integrated Course in Agroecosystem Management is foreseen in oral or written form, according to the number of candidates of the course. The test will consist in a discussion on the topic of the course including a practical exercise on some cases of study.
Assessment criteria	<ul style="list-style-type: none"> • <i>Knowledge and understanding</i> <ul style="list-style-type: none"> ○ The relationship existing between tree functionality and its water and nutritional status. ○ The many pedo-climate, hydrologic and physiologic variables used for setting up a program of irrigation and fertilization. ○ Low-input/high-efficiency agro-practices analysed during the class and how these can affect the orchard behaviour. ○ Basic knowledge for monitoring the orchard by means of sensors (proximal and remote), indices and other technologies linked to Smart Agriculture. • <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> ○ The measure of the main physiological processes determining the product formation. ○ Quantify water and nutrient needing in fruit tree species. ○ The implementation of the low-input/high-efficiency agro-practices in the field. ○ The use of the most widespread orchard monitoring devices and the correct interpretation of aDSS outputs and the correct interpretation of aDSS outputs and suggestions. • <i>Autonomy of judgment</i> <ul style="list-style-type: none"> ○ Ability to choose and combine the agro-practices, addressed in the class, according to the pedo-climate, the input factors availability, and the productive target to reach. ○ Ability to choose the most appropriate field sensors and aDSS taking into account their strength/weakness points, as well as the real the farm conditions to be faced.

	<ul style="list-style-type: none"> • <i>Communication skills</i> <ul style="list-style-type: none"> ○ Ability to communicate and discuss the issues addressed in the class with an appropriate terminology. • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Ability to deepen and upgrade the knowledge about the issues addressed in the class.
Final exam and grading criteria	<i>The final score is in a range from 18/30 to 30/30. The exam is considered passed if the is at least 18/30 and it contributes for 1/3 in determining the total score of the integrated course of Agro-ecosystem Management</i>
Further information	