Stampare su carta intestata del CdS

General information		
Academic subject	***Fruit tree eco-physiology and strategies to cope with climate change***	
Degree course	International Master of Science in Innovation Development in Agrifood Systems (IDEAS)	
Academic Year		
European Credit Transfer and Accumulation System (ECTS)		9 ECTS
Language	*English*	
Academic calendar (starting and ending date)	*I semester (October 18th , 2021 - January 28th 2022)*	
Attendance	*Strongly recommended*	

Professor/ Lecturer	
Name and Surname	Pasquale LOSCIALE
E-mail	pasquale.losciale@uniba.it
Telephone	
Department and address	*Department of Soil, Plant and Food Sciences, University of Bari "Aldo Moro"* *Via Amendola 165/A, 70126 Bari (Italy)*
Virtual headquarters	*Teams:* pasquale.losciale@uniba.it
Tutoring (time and day)	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.

Syllabus	
Learning Objectives	- *To provide knowledge and skills on the biomass recycle in order to attain a circular economy approach to produce new food, alternative amendments, biofuels and added value substances.* - *To provide knowledge to reduce the postharvest losses of products and increase the shelf life with innovative techniques.* - *To provide knowledge to select alternative food sources.* - *To provide knowledge and skills to adopt innovative adaptation and mitigation strategies to face the climate changes in agriculture.* - *To provide knowledge and skills to analyse and manage typical cropping systems in hot dry environments following the smart and low agriculture model.* - *To provide knowledge to manage the decision support systems (DSS), to analyse and interpret data and apply predictive models.* - *To provide knowledge for applying innovative technologies for crop and plant protection management.* - *To provide knowledge for adopting new breeding strategies and promoting local genotypes adapted to low input cropping systems* - *To provide knowledge and skills to reduce the environmental impact of agrifood production.* - *To provide knowledge and skills related to bioeconomy, circular economy, start-up launch, and social innovation.*
Course prerequisites	*Chemistry, Physics, Plant biology*
Contents	• **About the class and the educational agreement**

	• **Fruit tree eco-physiology under a changing climate** o Leaf functionality: physiology, measurement, environmental effects and adaptation strategies. - Photosynthesis, thermoregulation and photoperiod. - How do we measure? - Environmental effects and adaptation strategies (light stress, heat stress, drought stress and sub optimal soil conditions). o Water relations within the Soil-Plant-Atmosphere Continuum (SPAC): physiology, measurement, environmental effects and adaptation strategies. - The trip of a drop: water movement from the soil to the atmosphere (matric potential, water potential, stomatal conductance, Vapour Pressure Deficit). - How do we measure? - Environmental effects and adaptation strategies (water limitation, waterlogging, drought avoidance/tolerance/resistance mechanisms). o Fruit growth and its quality: physiology, measurement, environmental effects and adaptation strategies. - Fruit growth models in some representative fruit tree species; the source/sink relation within the tree - How do we measure? - Environmental effects and adaptation strategies. o Thermic requirements of fruit tree species in temperate zones: physiology, measurements, environmental effects and adaptation strategies. - Endodormancy, ecodormancy, chilling and heat requirements. - How do we measure and estimate? - Adaptation strategies. • **Innovative Agro-practices with low-input and high-efficiency** o Sustainability in the productive processes: definition and consequences. o Orchard design. o Canopy management. o Microclimate modulation. o "Carbon and water friendly" soil management. o Low-impact and high-efficiency water management. • **Orchard monitoring** o From Agriculture 1.0 toward Agriculture 5.0. o Knowing the orchard features to monitor it adequately. o Climate monitoring and the related sensors. o Soil monitoring and the related sensors o Plans Sensing and Sensors. o The multilayer approach. o Monitoring for managing: the Decision Support Systems in agriculture (aDSS) and the Internet of Things (IoT).
Books and bibliography	- Lecture notes, presentations, scientific papers and other didactic material will be provided by the teacher. - Selected chapters of the book: *Principles of Modern Fruit Science. Sansavini et al (ed). 2019. ISHS*
Additional materials	*Scientific papers, App etc. provided during the course*

Work schedule	

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Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
225	*48*	*42*	*135*
ECTS			
9	*6*	*3*	

Teaching strategy	Classroom lectures, classroom experiences (practicum), filed and lab activities, case study discussions, seminars held by experts. The course is performed in presence, unless exceptional conditions
Expected learning outcomes	
Knowledge and understanding on:	o The relationship existing between the main microclimate/pedological variables and fruit tree physiology and functioning. o The low-input/high-efficiency agro-practices analysed during the class and how these can affect the orchard behaviour. o Basic knowledge for monitoring the orchard correctly. o The most used field sensors and their strength/weakness points.
Applying knowledge and understanding on:	o Theoretical and practical knowledge on: o The measure of the main physiological processes determining the product formation. o The implementation of the low-input/high-efficiency agro-practices in the field. o The use of the most widespread orchard monitoring devices. o The correct interpretation of aDSS outputs and suggestions.
Soft skills	• *Making informed judgments and choices* o Ability to choose and combine the low-imput/high- efficiency agro-practices, addressed in the class, according to the pedo-climate, the input factors availability, and the productive target to reach. o 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. • *Communicating knowledge and understanding* o Ability to communicate and discuss the issues addressed in the class with an appropriate terminology. • *Capacities to continue learning* o Ability to deepen and upgrade the knowledge about the issues addressed in the class. The expected learning outcomes, in terms of knowledge and skills, are listed in Annex A of the Master Degree Course Regulation (expressed through the European Descriptors of Degree qualification).

Assessment and feedback	
Methods of assessment	Intermediate evaluation tests (esonero) are foreseen in oral or written form, according to the number of candidates. The final exam, on the remaining part of the class not evaluated by the esonero, will be taken in oral form.
Evaluation criteria	• *Knowledge and understanding*

	○ To identify the linkages existing between the pedo-climate variations and the tree functioning. *Applying knowledge and understanding* ○ To acquire the related skills for measuring the tree functioning and the productive performances. ○ To acquire the know how to apply the low-imput/high-efficiency strategies for managing the orchard. ○ To understand properly the meaning of the data provided by sensors and aDSSs used in the orchard. • *Autonomy of judgment* ○ Ability to choose and combine the low-imput/high- efficiency 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. • *Communication skills* ○ To be able to communicate and discuss the issues addressed in the class with an appropriate terminology; to link what has been learned during the class with other acquired knowledge. • *Capacities to continue learning* ○ Ability to find scientific sound information evaluating their reliability.
Criteria for assessment and attribution of the final mark	*The final score is in arrange from 18/30 to 30/30. The exam is considered passed if the is at least 18/30.*
Additional information	