

General information	
Academic subject	Principles of plant physiology (I.C. Principles of plant physiology and genetics)
Degree course	<i>Food Science and Technology (L26)</i>
Academic Year	<i>First</i>
European Credit Transfer and Accumulation System (ECTS)	3 ECTS
Language	<i>Italian</i>
Academic calendar (starting and ending date)	<i>March 13th, 2023 – June 16th, 2023</i>
Attendance	<i>Not compulsory</i>

Professor/ Lecturer	
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Department and address	<i>DIP. DISSPA – Università degli Studi di Bari</i>
Virtual headquarters	<i>Microsoft teams</i>
Tutoring (time and day)	<i>From Monday to Friday, by appointment</i>

Syllabus	
Learning Objectives	<i>The course aims to provide basic knowledge on the plant physiology, on the environmental factors regulating plant growth and development, as well as on the relationships between plant physiology and crop production quality.</i>
Course prerequisites	<i>Basic knowledge of biology.</i>
Contents	<p>Plant cell <i>Cellular organization, structural and functional traits of cell wall, membranes and organelles.</i></p> <p>Principles of plant histology and anatomy <i>Morphology and anatomy of root, stem and leaf in monocots and dicots.</i></p> <p>Water cycle in the soil-plant-atmosphere system <i>Diffusion, osmosis and mass flow; water potential of plant cells and its components; water in soil; water uptake and transport inside plants; radical pressure; transpiration and its regulation.</i></p> <p>Mineral nutrition and solute transport <i>Essential, accessory and toxic elements; nutrient deficiencies and strategies to overcome them; rhizosphere; plant symbiosis with mycorrhizal fungi and nitrogen-fixing bacteria. Electrochemical potential of solutes; membrane potential; passive and active (primary and secondary) transport of solutes across the cell membrane; solute movement through symplast, apoplast and trans-membrane way.</i></p> <p>Translocation in the phloem <i>Definition of source and sink; phloem sap composition; pressure-flow model; phloem loading and unloading.</i></p> <p>Plant hormones and regulation of the plant growth <i>Role of auxin, gibberellin, cytokinin, ethylene and abscisic acid in the regulation of plant growth and development.</i></p> <p>Plant responses to abiotic stresses <i>Definition of adaptation and acclimation; plant defence mechanisms against stress induced by aridity/waterlogging, low/high temperatures, element unbalances in soil. Role of secondary metabolites in plant responses to stress.</i></p>
Books and bibliography	<ul style="list-style-type: none"> • Taiz L., Zeiger E. <i>Plant Physiology. Fourth Edition. Sinauer Associates Inc., 2006.</i>

Additional materials	<i>Notes of lectures, as well as slides and other bibliographic materials provided by the Professor during the course.</i>
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Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/Self-study hours
Hours			
75	16	14	45
ECTS			
3	2	1	
Teaching strategy	<i>Topics will be illustrated by means of Power Point presentations, and classroom and laboratory exercises. Copies of all Power Point presentations and teaching material used for lectures and practical activities can be requested by e-mail or downloaded from web platforms.</i>		
Expected learning outcomes	The expected learning outcomes, in terms of both knowledge and skills, are provided in Annex A of the Academic Regulations of the Degree in Food Science and Technology (expressed through the European Descriptors of the qualification)		
Knowledge and understanding on:	<ul style="list-style-type: none"> ○ Adequate knowledge to understand the basic principles governing the functioning of plants of food interest. 		
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ Ability to identify and distinguish cause-and-effect relationships within the various phenomena governing the plant physiology. 		
Soft skills	<ul style="list-style-type: none"> ● <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> ○ Ability to interpret and predict the different plant physiological responses to the changing environmental conditions. ○ Ability to acquire the necessary information on the plant-environment interaction mechanisms in order to assess their implications in the crop production. ● <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ Ability to communicate the knowledge acquired during the course with a technical and scientific language. ● <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Ability to deepen and update the knowledge acquired about the plant physiology, in the view of optimizing the quality of plant production. 		
The expected learning outcomes, in terms of both knowledge and skills, are provided in Annex A of the Academic Regulations of the Degree in Food Science and Technology (expressed through the European Descriptors of the qualification).			

Assessment and feedback	
Methods of assessment	The exam consists of an oral dissertation on the topics developed during the theoretical and theoretical-practical lectures both in the classroom and in the laboratory, as reported in the Academic Regulations for the Bachelor Degree in Food Science and Technology (article 9) and in the study plan (Annex A). Students attending at the lectures may have a middle-term preliminary exam, consisting of a written test, relative to the first part of the program, which will concur to the final evaluation and will be considered valid for an academic year. The evaluation of the preparation of the student occurs on the basis of established criteria, as detailed in Annex B of the Academic Regulations for the Bachelor's degree in food science and Technology.

	The foreign student's profit test can be done in English in the way described above.
Evaluation criteria	<ul style="list-style-type: none"> • <i>Knowledge and understanding</i> <ul style="list-style-type: none"> ○ To demonstrate a critical and in-depth assimilation of the major topics of plant physiology, and an adequate knowledge of the plant-environment interactions. • <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> ○ To be able to relate the knowledge acquired about plant physiology to the production performance of plants of food interest. • <i>Autonomy of judgment</i> <ul style="list-style-type: none"> ○ To interpret and predict the plant physiological responses. To demonstrate conscious autonomy of judgment with regard to the evaluation and interpretation of experimental data, also in the light of the technical and scientific literature. • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ The student will acquire understanding and communication skills to analyse analytical data related to the plant physiology and discuss about them with interlocutors with similar and different backgrounds. • <i>Communication skills</i> <ul style="list-style-type: none"> ○ The student will be evaluated considering the use of appropriate technical language. • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Ability to understand and critically discuss fundamental aspects of the plant physiology, including consultation of online databases.
Criteria for assessment and attribution of the final mark	The evaluation criteria that contribute to the attribution of the final mark will be: knowledge and understanding, the ability to apply knowledge, autonomy of judgment, i.e. the ability to criticize and formulate judgments, communication skills.
Additional information	