

**COURSE OF STUDY** Bachelor degree: Food Science and Technology (L-26)

**ACADEMIC YEAR** 2023-2024

**ACADEMIC SUBJECT** Principles of plant physiology (3 ECTS) - I.C. Principles of plant physiology and genetics (6 ECTS)

General information	
Year of the course	First
Academic calendar (starting and ending date)	Second semester (March 4 <sup>th</sup> – June 14 <sup>th</sup> , 2024)
Credits (CFU/ECTS):	3
SSD	Plant physiology (BIO/04)
Language	Italian
Mode of attendance	Not Compulsory

Professor/ Lecturer	
Name and Surname	Concetta Eliana Gattullo
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Telephone	0805442852
Department and address	DIP. DISSPA – Università degli Studi di Bari
Virtual room	Microsoft teams
Office Hours (and modalities: e.g., by appointment, on line, etc.)	From Monday to Friday, by appointment

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	

<b>Learning Objectives</b>	The course aims to provide basic knowledge on plant physiology, on the environmental factors regulating plant growth and development, as well as on the relationships between plant physiology and crop production quality.
<b>Course prerequisites</b>	Basic knowledge of biology and general chemistry. The exam does not require mandatory prerequisites.

<b>Teaching strategies</b>	Topics will be illustrated by means of PowerPoint presentations, and classroom and laboratory exercises. Copies of all PowerPoint presentations and teaching material used for lectures and practical activities can be requested by e-mail or downloaded from Microsoft Teams (code to be requested from the Professor).
<b>Expected learning outcomes in terms of</b>	
<b>Knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>Knowledge of the basic principles governing the functioning, growth and development of plants.</li> </ul>

	<ul style="list-style-type: none"> <li>Understanding of the main plant physiological processes influencing the production quality of food plants.</li> </ul>
<b>Applying knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>Ability to identify and monitor cause-effect relationships within the various phenomena governing the plant physiology and the quality of production of plants of food interest.</li> </ul>
<b>Soft skills</b>	<ul style="list-style-type: none"> <li>Making informed judgments and choices: <ul style="list-style-type: none"> <li>Ability to understand and predict the different plant physiological responses to the changing environmental conditions.</li> <li>Ability to acquire the necessary information on the plant-environment interaction mechanisms in order to assess their implications for crop production.</li> </ul> </li> <li>Communicating knowledge and understanding: <ul style="list-style-type: none"> <li>Ability to communicate in a technical and scientific language the knowledge learnt during the course and to describe, also by means of practical examples, the most relevant plant physiological processes connected with food production.</li> </ul> </li> <li>Capacities to continue learning: <ul style="list-style-type: none"> <li>Ability to deepen and update the knowledge acquired about the plant physiology, in the view of optimizing the quality of plant production.</li> </ul> </li> </ul>
<b>Syllabus</b>	
<b>Content knowledge</b>	<p><b>Plant cell</b> <i>Cellular organization, structural and functional traits of cell wall, membranes, and organelles.</i></p> <p><b>Principles of plant histology and anatomy</b> <i>Morphology and anatomy of root, stem and leaf in monocots and dicots.</i></p> <p><b>Water cycle in the soil-plant-atmosphere system</b> <i>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><b>Mineral nutrition and solute transport</b> <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><b>Translocation in the phloem</b> <i>Definition of source and sink; phloem sap composition; pressure-flow model; phloem loading and unloading.</i></p> <p><b>Plant responses to abiotic stresses</b> <i>Plant defence mechanisms against stress induced by aridity, salinity, and element unbalances in soil. Role of secondary metabolites and plant hormones in plant responses to stress.</i></p>
<b>Texts and readings</b>	<ul style="list-style-type: none"> <li>Lincoln Taiz, Eduardo Zeiger, Ian Max Moller and Angus Murphy (2015). Plant Physiology and Development, 6<sup>th</sup> Edition. Sinauer Associates.</li> </ul>
<b>Notes, additional materials</b>	<ul style="list-style-type: none"> <li>Notes of lectures, as well as slides and other bibliographic materials will be provided by the Professor during the course.</li> </ul>
<b>Repository</b>	All teaching material will be available to students on Microsoft Teams (code to be requested from the Professor)

Assessment	
Assessment methods	<p>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's Degree in Food Science and Technology (article 9) and in the study plan (Annex A).</p> <p>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.</p> <p>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.</p> <p>The foreign student's profit test can be done in English in the way described above.</p>
Assessment criteria	<ul style="list-style-type: none"> <li>● Knowledge and understanding: <ul style="list-style-type: none"> <li>○ To demonstrate a critical and in-depth assimilation of the major topics of plant physiology, and an adequate knowledge of the plant-environment interactions.</li> </ul> </li> <li>● Applying knowledge and understanding: <ul style="list-style-type: none"> <li>○ To be able to relate the knowledge acquired about plant physiology to the production performance of plants of food interest, especially to production quality.</li> </ul> </li> <li>● Autonomy of judgment: <ul style="list-style-type: none"> <li>○ To understand 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.</li> </ul> </li> <li>● Communicating knowledge and understanding: <ul style="list-style-type: none"> <li>○ 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.</li> </ul> </li> <li>● Communication skills: <ul style="list-style-type: none"> <li>○ The student will be evaluated considering the use of appropriate technical and scientific language.</li> </ul> </li> <li>● Capacities to continue learning: <ul style="list-style-type: none"> <li>○ Ability to understand and critically discuss fundamental aspects of the plant physiology, including consultation of online databases.</li> </ul> </li> </ul>
Final exam and grading criteria	<p>The assessment of the student's preparation is based on predetermined criteria in accordance with the Didactic Regulations of the Bachelor's Degree Course in Food Science and Technology (Annex B). The Examination Committee has a score ranging from a minimum of 18 to a maximum of 30 points for a positive assessment of the student's performance. The Committee may award honours in cases where the final mark is 30.</p>
Further information	