

General information	
Academic subject	Agricultural biochemistry and plant nutrition C.I. Agricultural biochemistry and biology of microorganisms (9 ECTS)
Degree course	Agricultural Sciences and Technologies-L25
Academic Year	Second year, curriculum GSR
European Credit Transfer and Accumulation System (ECTS)	6
Language	Italian
Academic calendar (starting and ending date)	II semester, 1 March 2022 – 17 June 2022
Attendance	Not compulsory, strongly suggested

Professor/ Lecturer	
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Department and address	University of Bari "Aldo Moro", Department of Soil, Plant and Food Sciences, Chemistry and Biochemistry Section, Via Amendola 165/A, Bari
Virtual headquarters	Microsoft Teams (Team code to be communicated)
Tutoring (time and day)	Every day, on appointment

Syllabus	
<b>Learning Objectives</b>	Study of the main concepts at the basis of plant life: membranes, energy, metabolisms. Main nutrition sources for plants: atmosphere, water, and soil. From the atmosphere plants uptake carbon dioxide to be converted into organic biomass while oxygen is released into the atmosphere through respiration processes. Soil is the main source of water and nutrients for plants. The role of water and essential elements for plant development and adaptation to the external environment.
<b>Course prerequisites</b>	Basic knowledge of general and organic chemistry, plant biology and soil chemistry. Requirements: Chemistry.
<b>Contents</b>	<ul style="list-style-type: none"> <li>• <b>Biomolecules:</b> carbohydrates, aminoacids, proteins, lipids, nucleic acids.</li> <li>• <b>Enzymes:</b> classification, principles, kinetics.</li> <li>• <b>Biological membranes:</b> composition, structure, properties, transporters.</li> <li>• <b>Bioenergetics:</b> high energy molecules, principles and mechanisms of energy fluxes in cells.</li> <li>• <b>Primary metabolisms:</b> photosynthesis, respiration.</li> <li>• <b>Water and water balance in plants:</b> the importance of water and its transport in soil and plant.</li> <li>• <b>Mineral nutrition of plants:</b> essential elements and mechanisms of acquisition and assimilation.</li> </ul>
<b>Books and bibliography</b>	<ul style="list-style-type: none"> <li>• Taiz L., Zeiger E. "Plant Physiology", Sinauer Associates Inc., U.S.A.</li> <li>• D. L. Nelson, M. M. Cox "Lehninger's Principles of Biochemistry", Macmillan Editor.</li> </ul>
<b>Additional materials</b>	Additional material might be made available to students during the course

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours

Hours			
150	40	14	96
ECTS			
6	5	1	
Teaching strategy			
		Lectures will be presented through Power Point presentations, using the blackboard or other telematics tools. Depending on the situation, the lectures will be in presence, by remote or hybrid.	
Expected learning outcomes			
<b>Knowledge and understanding on:</b>		<ul style="list-style-type: none"> <li>○ Understanding and learning about essential elements and processes at the basis of plant life</li> <li>○ Understanding the importance of metabolisms and energy transformations in plants and the environment.</li> <li>○ Understanding the role of primary sources (atmosphere, water and soil) for plant nutrition and life.</li> </ul>	
<b>Applying knowledge and understanding on:</b>		<ul style="list-style-type: none"> <li>○ Applying the knowledge to the choice of the best cultivation strategies and soil fertilization practices.</li> </ul>	
<b>Soft skills</b>		<ul style="list-style-type: none"> <li>• <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> <li>○ Independent understanding and elaboration of complex problems and solutions within issues related to agricultural productions.</li> </ul> </li> <li>• <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Communicating skills to discuss appropriately with production technicians and product managers on sound scientific basis as well as with representatives of public and private institutions.</li> <li>○ Ability to coordinate different technical areas in agricultural productions.</li> <li>○ Reporting and disseminating knowledge and the results of projects and activities developed independently or within working groups.</li> </ul> </li> <li>• <i>Capacities to continue learning.</i> <ul style="list-style-type: none"> <li>○ Independency in acquiring and developing new knowledge and technical skills.</li> <li>○ Ability to learn how to face and solve problems related to the profession of agronomist and to develop skills at the basis of agricultural productions and plant protection.</li> <li>○ Getting the basic methodological and theoretical skills necessary to continue the formation with master studies in Agricultural and Food Sciences.</li> </ul> </li> </ul>	
Assessment and feedback			
Methods of assessment		The exam consists of an oral test with questions related to the programme. Student's assessment is based on established criteria as detailed in Annex A of the Degree Course Didactic Rules. For the students undertaking the mid-term exam, the final evaluation will be the average of the marks of the mid-term and the final exams. Foreign students can use English language during the exam.	
Evaluation criteria		<ul style="list-style-type: none"> <li>• <i>Knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Knowledge about essential elements and processes at the basis of plant life.</li> <li>○ Knowledge of metabolisms and energy transformations in plants and the environment.</li> <li>○ Knowledge of the role of primary sources (atmosphere, water and soil) for</li> </ul> </li> </ul>	

	<p>plant nutrition and life, and of the mechanisms through which plants acquire and assimilate nutrients.</p> <ul style="list-style-type: none"> <li>• <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Ability to use the basic knowledge to solve problems related to soil fertility and plant production.</li> </ul> </li> <li>• <i>Autonomy of judgment</i> <ul style="list-style-type: none"> <li>○ Ability to independently and critically understand and elaborate solutions to complex problems in the field of agricultural productions.</li> </ul> </li> <li>• <i>Communication skills</i> <ul style="list-style-type: none"> <li>○ Ability to express acquired knowledge through a sound scientific language.</li> </ul> </li> <li>• <i>Capacities to continue learning</i> <ul style="list-style-type: none"> <li>○ Ability to independently acquire new competences and knowledge useful for a continuous professional development.</li> </ul> </li> </ul>
Criteria for assessment and attribution of the final mark	The final mark is expressed as thirtieths. The exam is passed if the student get a mark equal or higher than 18.
<b>Additional information</b>	