

General information	
Academic subject	Agricultural Biochemistry (I.C. Agricultural Biochemistry, Plant Physiology, and Biology of Microorganisms)
Degree course	Agricultural Sciences and Technology
Academic Year	Second
European Credit Transfer and Accumulation System (ECTS)	6
Language	Italian
Academic calendar (starting and ending date)	March 1, 2022 – June 17, 2022
Attendance	Optional

Professor/ Lecturer	
Name and Surname	Valeria D’Orazio
E-mail	valeria.dorazio@uniba.it
Telephone	+ 39 080 544 3166
Department and address	Campus di Via E. Orabona, 4 – Plexus of Agriculture - Dept. of Soil, Plant and Food Sciences (DISSPA) – Division of Chemistry and Biochemistry; floor 1, room 6.
Virtual headquarters	Microsoft Teams
Tutoring (time and day)	From Monday to Friday, at the teacher's office and / or on the Teams platform (team code: q6pwp97), by appointment to be agreed by e-mail

Syllabus	
Learning Objectives	The course aims to provide students with the key to understanding the chemical and biological context in which the molecules, reactions and metabolic pathways underlying the life cycle of plants are framed.
Course prerequisites	Basic knowledge of General and Organic Chemistry (propaedeutic) and Plant Biology
Contents	<p>Bioenergetics principles. Energy transfer. Transfer of phosphoric groups and ATP cycle. Electron transporters, structure and biochemical role. Red-ox reactions. Reduction potential.</p> <p>Biological macromolecules: carbohydrates, lipids, proteins, polynucleotides. Modeling of macromolecules. Electrophoresis.</p> <p>Biochemical transformations and enzymatic catalysis. Specificity of enzymes. Enzymatic and kinetic activity. Factors that influence the activity of enzymes. Enzymatic inhibition and regulation. Spectroscopy. Direct and indirect methods. Enzymatic dosage.</p> <p>Primary carbon metabolism. Glycolysis. Oxidative decarboxylation. Tricarboxylic acid cycle. Respiratory chain and oxidative phosphorylation. Via the pentose-phosphate.</p> <p>Lipid metabolism. β-oxidation of fatty acids. Glyoxylate cycle. Nitrogen metabolism. Catabolism of amino acids. Urea cycle in plants. Photosynthesis. Chemistry and physiology of photosynthetic pigments. Photosynthetic unit and photosystems. Photosynthetic electron transport and photo-phosphorylation. Photosynthetic assimilation of carbon: C3 cycle, photo-respiration, C4 cycle, CAM plants.</p>
Books and bibliography	<ul style="list-style-type: none"> D. L. Nelson, M. M. Cox, Introduzione alla biochimica di Lehninger, Zanichelli, 6 edizione, 2018; Taiz L., Zeiger E. “Fisiologia Vegetale”, Piccin Editore, Padova. Ed 2009
Additional materials	<ul style="list-style-type: none"> Lecture notes

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
Hours			
150	32	28	90
ECTS			
6	4	2	
Teaching strategy			
Lectures will be held with Power Point slides help, practical using the blackboard with the involvement of students			
Expected learning outcomes			
Knowledge and understanding on:	<ul style="list-style-type: none"> ○ Students will acquire knowledge of the main chemical and structural characteristics of biomolecules in relation to their role in cell metabolism; they will analyze the properties and functions of enzymes and their regulation, bioenergetics and trans-membrane transport, the metabolic pathways and their regulation 		
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ The skills acquired through the course are the bases necessary for understanding the chemical changes that organic matter undergoes in living organisms and the relationships between these changes and the qualitative, quantitative and technological aspects of agricultural production 		
Soft skills	<ul style="list-style-type: none"> • <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> ○ Students will be able to evaluate independently the importance of the chemical characteristics of biomolecules for the functioning of the main metabolic processes in living organisms • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ Ability to communicate with entrepreneurs and production technicians, with responsible for public and private agencies, encourage coordination between technical areas of production; present the results of projects and works developed independently and/or in group activity, by means of technical reports • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Expected learning results, in terms of knowledge and skill, are reported in the Attachment A of the Learning Regulation of the Bachelor's Degree in Agricultural Sciences and Technology (stated by the European descriptors of the educational qualification; field of agricultural sciences) 		

Assessment and feedback	
Methods of assessment	<p>The evaluation of the student skill is based on pre-defined parameters, as reported in the Attachment A of the Learning Regulation of the Bachelor's degree in Agricultural Sciences and Technology. The exam consists of an oral test with questions related to the programme, as reported on the Learning Regulation of the Bachelor's degree in Agricultural Sciences and Technology and on the study plan (Attachment A). A discretionary mid term oral test, valid throughout the entire year, providing only the admission to the final exam, is scheduled for all students attending the regular year's course. The evaluation of the final exam will take into account the performance of the mid term test and will be expressed in thirtieths.</p> <p>Foreign students follow the same rules but their exam can be given in English language.</p>

Evaluation criteria	<ul style="list-style-type: none"> • <i>Knowledge and understanding</i> <ul style="list-style-type: none"> ○ The student will have to know the main chemical and structural characteristics of biomolecules in relation to their role in cell metabolism; the properties and functions of enzymes and their regulation, bioenergetics and trans-membrane transport, the metabolic pathways and their regulation • <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> ○ The student will have to know the chemical changes that organic matter undergoes in living organisms and the relationships between these changes and the qualitative, quantitative and technological aspects of agricultural production. • <i>Autonomy of judgment</i> <ul style="list-style-type: none"> ○ The student must be able to evaluate independently the importance of the chemical characteristics of biomolecules for the functioning of the main metabolic processes in living organisms. • <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ The student must be able to communicate with entrepreneurs and production technicians, with responsible for public and private agencies; to encourage coordination between technical areas of production; to present the results of projects and works developed independently and/or in group activity, by means of technical reports. • <i>Communication skills</i> <ul style="list-style-type: none"> ○ Ability to compare their knowledge with colleagues in the field of agricultural biochemistry • <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ The student must demonstrate that he has learned, in terms of knowledge and skill, what has been reported in the Attachment A of the Learning Regulation of the Bachelor's Degree in Agricultural Sciences and Technology (stated by the European descriptors of the educational qualification; field of agricultural sciences)
Criteria for assessment and attribution of the final mark	The final grade is awarded out of thirty. The exam is passed when the grade is greater than or equal to 18. The final mark is attributed also considering the evaluations of the two modules that are part of the I.C.
Additional information	