

General Information	
Academic subject	Agricultural Biochemistry (I.C. Agricultural Biochemistry, Plant Physiology, and Biology of Microorganisms)
Degree course	Agricultural Sciences and Technology
Curriculum	Crop production and crop protection
ECTS credits	6
Compulsory attendance	No
Language	Italian

Subject teacher	Name Surname	Mail address	SSD
	Valeria D'Orazio	valeria.dorazio@uniba.it	AGR/13

ECTS credits details			
Basic teaching activities	Lectures (4 ECTS)	Practical (2 ECTS)	

Class schedule	
Period	Second semester
Year	Second year
Type of class	Lectures – Practical

Time management	
Hours	150
In-class study hours	60
Out-of-class study hours	90

Academic calendar	
Class begins	March 1, 2020
Class end	June 11, 2021

Syllabus	
Prerequisites/requirements	Basic knowledge of General and Organic Chemistry (propaedeutic) and Plant Biology
Expected learning outcomes (according to Dublin Descriptors)	<ul style="list-style-type: none"> • <i>Knowledge and understanding</i> 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, • <i>Applying knowledge and understanding</i> 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. • <i>Making informed judgements and choices</i> 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>

	<p>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.</p> <ul style="list-style-type: none"> • <i>Capacities to continue learning</i> <p>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)</p>
Contents	<p>Organization of living matter. Metabolites and macromolecules. Properties of macromolecules. Cellular metabolism. Catabolism, anabolism and energy metabolism. Metabolic energy production and consumption. Bioenergetics. Thermodynamics of living systems. The metabolic cycles and their regulation. The capture of light energy and the organization of CO₂. The breathing / photosynthesis balance. Photo-breathing and the impact on agricultural production. The resources of the plant cell.</p>

Course program	<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.</p> <p>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. Enzymatic assays.</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.</p> <p>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>
Bibliography	<ul style="list-style-type: none"> • lecture notes; • 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
Notes	<p>The texts are available at the central library and at the study of the teacher in charge of the teaching.</p>

Teaching methods	Lectures will be held with Power Point slides help, practical using the blackboard with the involvement of students
Assessment methods	<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> 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> 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>Making informed judgements and choices</i> 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> 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>Capacities to continue learning</i> 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)
Receiving times	From Monday to Friday, by appointment to be agreed by e-mail