

**COURSE OF STUDY** *Bachelor degree: Food Science and Technology (L26)*
**ACADEMIC YEAR** 2023-2024

**ACADEMIC SUBJECT** *Principles of Biochemistry (3 ECTS) - I.C. General and food biochemistry (9 ECTS)*

General information	
Year of the course	Second
Academic calendar (starting and ending date)	September 25, 2023 – January 19, 2024
Credits (CFU/ETCS):	3
SSD	AGR/13 – Agricultural chemistry
Language	Italian
Mode of attendance	Optional

Professor/ Lecturer	
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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 room	Teams’ platform, team code: 2zed7np
Office Hours (and modalities: e.g., by appointment, on line, etc.)	From Monday to Friday, at the teacher's office and / or on the Teams platform, by appointment to be agreed by e-mail

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	1	2	

<b>Learning Objectives</b>	The course aims to provide the student with adequate knowledge of the basics of biochemical processes and in particular of the structure and functions of macromolecules of biological interest, bioenergetics and enzymatic catalysis.
<b>Course prerequisites</b>	Basic knowledge of General and Organic Chemistry and Plant Biology

<b>Teaching strategie</b>	Lectures will be held with Power Point slides help, practical using the blackboard with the involvement of students
<b>Expected learning outcomes in terms of</b>	
<b>Knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>Students will acquire knowledge of the main chemical and structural characteristics of biomolecules, bioenergetics, and the properties and functions of enzymes.</li> </ul>
<b>Applying knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>The skills acquired with the course constitute the necessary foundations for understanding both the biochemical transformations that matter undergoes and the relationships between these transformations and the qualitative-quantitative aspects in food technology</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>○ Students will be able to autonomously evaluate the importance that the chemical characteristics of certain biomolecules have in different processes.</li> </ul> </li> <li>• <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Ability to communicate with entrepreneurs and/or production technicians, with managers of public and/or private bodies; foster coordination between the technical areas responsible for production; present the results of projects and works developed personally or in group activities, by drafting technical reports</li> </ul> </li> <li>• <i>Capacities to continue learning</i> <ul style="list-style-type: none"> <li>○ The expected learning outcomes, in terms of knowledge and skills, are shown in Annex A of the Educational Regulations of the three-year Degree Course in Food Science and Technology (expressed using the European Descriptors of the qualification).</li> </ul> </li> </ul>
<b>Syllabus</b>	
<b>Content knowledge</b>	<p>Principles of bioenergetics. Energy transfer. Transfer of phosphoric groups and the ATP cycle. Electron carriers, structure and biochemical role. Redox reactions. Reduction potential.</p> <p>Biological macromolecules: carbohydrates, lipids, proteins, polynucleotides. Modeling of macromolecules. Electrophoresis.</p> <p>Biochemical transformations and enzymatic catalysis. Enzyme specificity. Enzyme activity and enzyme kinetics. Factors affecting the activity of enzymes. Enzymatic inhibition and regulation. Spectroscopy. Direct and indirect methods. Enzyme dosage.</p>
<b>Texts and readings</b>	D. L. Nelson, M. M. Cox, Introduzione alla biochimica di Lehninger, Zanichelli, 6 edizione, 2018;
<b>Notes, additional materials</b>	Lecture notes
<b>Repository</b>	The texts are available at the Central Agricultural Library and at the studio of the professor in charge of the course

<b>Assessment</b>	
<b>Assessment methods</b>	<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 Food Science and Technology and on the study plan (Attachment A).</p> <p>For students enrolled in the year of the course in which the teaching is carried out, there is an optional intermediate test, which consists of a written test with closed and open answers on topics developed by the date of the test itself. The intermediate test is evaluated out of thirty and, in case of a positive outcome, in the final oral test the interview will focus on the remaining part of the teaching contents. The result of the intermediate test is communicated by publication on the student's electronic register and contributes to the evaluation of the exam by calculating the weighted average and is valid for one academic year.</p>
<b>Assessment criteria</b>	<ul style="list-style-type: none"> <li>• <i>Knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ The student will have to know the main chemical and structural characteristics of biomolecules in relation to their function in cellular metabolism; the properties and functions of enzymes and their regulation, bioenergetics</li> </ul> </li> <li>• <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ The student will have to know both the biochemical transformations that matter undergoes and the relationships between these transformations and the qualitative-quantitative aspects in food technology.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• <i>Autonomy of judgment</i> <ul style="list-style-type: none"> <li>○ The student will have to autonomously evaluate the importance that the chemical characteristics of certain biomolecules have in the various processes.</li> </ul> </li> <li>• <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ 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.</li> </ul> </li> <li>• <i>Communication skills</i> <ul style="list-style-type: none"> <li>○ The student must be able to compare its knowledge with colleagues in the field of food biochemistry</li> </ul> </li> <li>• <i>Capacities to continue learning</i> <ul style="list-style-type: none"> <li>○ The student must demonstrate that he has learned, in terms of knowledge and skills, what is reported in Annex A of the Academic Regulations of the Degree in Food Science and Technology (expressed by the European descriptors of the degree; food science sector)</li> </ul> </li> </ul>
Final exam and grading criteria	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 module that is part of the I.C.
<b>Further information</b>	