



## CLASS FORM

<b>Degree</b>	<b>Biological Sciences</b>
<b>Name of the class:</b>	<b>Biochemistry</b>
<b>Number of Credits:</b>	<b>9 CFU</b>
<b>Semester:</b>	<b>First</b>
<b>Teacher</b>	<b>Prof. Francesco Paolo Mancini</b>
<b>PhD students/research assistants that support teaching activities:</b>	<b>None</b>
<b>Office hours:</b>	<b>Every day, by appointment</b>
<b>Address:</b>	<b>Via Port'Arsa, 11 - 82100 Benevento</b>

### OUTLINE OF THE CLASS:

The class of Biochemistry illustrates to the students the molecular bases of the living matter, the structure and function of the biological macromolecules, and the molecular mechanisms of the energy, carbohydrate, protein, and lipid metabolism. The class is designed to facilitate the learning by providing examples, correlations, logical-deductive reasoning with regard to the topics of the program of the exam.

### TEACHING GOALS

The class intends on helping the student to get the knowledge detailed in the program of the exam, the understanding of the molecular mechanisms involved in the main biological processes, and the ability of identifying the impact of such knowledge in the professional activities that pertain to the Biologist and of analyzing autonomously biological issues at the molecular level.

### PRIOR REQUIREMENTS

In order to successfully deal with the study of Biochemistry, it is strongly recommended to have a good knowledge of mathematics, chemistry, physics, and basic cell biology.

### ATTENDANCE TO THE CLASS

The attendance to the class is strongly recommended because the teacher is committed to facilitate learning and comprehension of Biochemistry through the integration of the various topics of the program with examples, correlations, and basic notions from different areas of biology. The other important point in favor of attending the class is the possibility for the students to ask questions during and after the lesson about concepts of the same or previous lessons that were not clear enough. Not only the single students, but all those attending the class can take advantage of such additional explanations by the teacher.

## **CLASS PROGRAM**

Structural and functional organization of the living matter in prokaryotes and eukaryotes. The relevance of non covalent bonds in biology. Structure, functions, and physical-chemical properties of H<sub>2</sub>O. The relevance of the acid-base equilibrium in biology and the equation of Henderso-Hasselbalch. The solubility in H<sub>2</sub>O of the biological macromolecules. Amino acids -The peptide bond - The structural organization levels of proteins. Fibrous proteins: keratins, fibroin, collagen, and elastin. Structure and function of myoglobin and hemoglobin. Basic principles of thermodynamics: entropy, enthalpy, free energy. Enzymes: enzymatic kinetics, models of enzyme-substrate interaction, enzymatic specificity, mechanisms of action and regulation, enzymatic inhibition, coenzymes. Bioenergetics: ATP and high-energy compounds in energy exchange. Metabolism and its functional levels. Structure and functions of carbohydrates and glucidic metabolism: glycolysis, fermentations, Cori's cycle, pentose phosphate pathway, biosynthesis and degradation of glycogen, gluconeogenesis, and respective regulatory mechanisms. Krebs' cycle, its regulation, and anaplerotic reactions. Glyoxylate cycle. Oxidative phosphorylation. and electron transport chain. Structure and functions of lipids, and lipid metabolism: transport, biosynthesis and oxidation of fatty acids, metabolism of triglycerides. Regulatory mechanisms of the respective pathways. Amino acid metabolism: transamination and urea cycle. Integration of metabolism.

## **TEACHING TOOLS**

The class consists of lessons by the teacher, with the continuous encouragement to an interactive participation of the student by asking questions and making comments about the topics of the lessons, during or after the lesson or by meeting the teacher individually or in small groups upon making an appointment.

## **TEXTBOOKS**

- 1) Biochimica - Quarta Edizione - Christopher K. Mathews, K.E. van Holde & Kevin G. Ahern- Casa Editrice Ambrosiana, Milano.
- 2) Biochimica - Quarta Edizione - Lubert Stryer - W.H.Freeman & Co., New York
- 3) Digital slides of the class.

## EXAMS

Written and oral exam. Written test consist of 30 multiple choice questions, with only one correct answer. Each correct answer yields one point, and each wrong or missing answer yields zero points. The student who get 18 or more points pass the test and is admitted to the oral exam. There is a written text in the middle of the class, organized as described above, and covering the first half of the program. This intermediate text is optional and the final score will be the mean of the scores of the written and oral exams.

## DATES OF EXAMS

Available at: <http://www.dstunisannio.it/index.php/studenti/appelli-esami>

## RESERVATION OF EXAMS

Available at: <https://servizistudenti.unisannio.it/pls/self/gissweb.home>

## SYLLABUS

Topics	Hours	Textbooks	Type of lessons
Introductory concepts about water, water solutions, and non covalent bonds	8	1) Biochimica-Mathews,van Holde, Ahern, Ed. Ambrosiana, Milano. 2) Biochimica - Stryer - W.H.Freeman & Co., New York	In the classroom
Structure and functions of proteins and nitrogen elimination	16	Same	Same
Oxygen transportation in the blood	8	Same	Same
Structure, function, and metabolism of carbohydrates	10	Same	Same
Structure, function, and metabolism of lipids	8	Same	Same
Enzimologia	10	Same	Same
Energy and reducing power metabolism	12	Same	Same