DIPARTIMENTO DI SCIENZE

ACADEMIC YEAR: **2018-2019**	
COURSE: **BIOCHEMISTRY**	
TYPE OF EDUCATIONAL ACTIVITY: **base**	
TEACHER: **Prof. M. Antonietta Castiglione Morelli**	
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Language: **ITALIAN**	

ECTS: **8** (7 of lessons and 1 of tutorials/practice)	n. of hours : **68** (56 lessons and 12 tutorials/practice)	Campus: **Potenza** Dept: **Dipartimento di Scienze** CdS: **BIOTECNOLOGIE (L2)**	Semester: **II** (beginning from march 1 2019; end from 31 may to june 20 2019)

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

Knowledge and understanding The main objective of the course is to provide the tools for understanding the molecular basis of biological systems and the biochemical mechanisms which regulate cellular metabolic activities by the knowledge of the structure, properties, functions and interactions of biomolecules (sugars, proteins, lipids and nucleic acids); the study of metabolism of the main biochemical molecules, production and conservation of metabolic energy.

Applying knowledge and understanding The student will gain the basic knowledge of biochemistry and metabolism. The student will be able: to recognize the structure and function of biomolecules; to know the principal metabolic pathways and their regulation; to have a general view of the fundamentals of metabolism and integrated regulation of metabolic pathways.

Making judgments, communication and learning skills From the laboratory experience the student will learn to work autonomously or in small groups for executing experimental protocols; the student will learn how to obtain and interpret scientific data from public web sites in English or data derived from experimental measurements; he/she will learn to write short scientific reports that will be discussed during the oral examination.

PRE-REQUIREMENTS

It is necessary to have a basic knowledge of Organic Chemistry

SYLLABUS

Introduction to Biochemistry. Biomolecules and their properties (2 hours)
Water and weak interactions in aqueous systems (2 hours)
Amino acids and their properties (2 hours)
Peptide bond formation. Peptides and proteins. Introduction to protein study. Protein structure. Primary structure. Methods for sequencing and synthesis of peptides and small proteins (4 hours)
Secondary, tertiary and quaternary structure of proteins. Folding and unfolding of proteins. Fibrous and globular proteins (6 hours)
Myoglobin and hemoglobin: structure and oxygen transport. Muscle proteins and muscular contraction (3 hours)
Enzymes: catalysis and catalyzers; coenzymes and cofactors; enzyme classification; mechanisms of some enzymes; enzyme kinetics; principles on the regulation of enzyme activity (5 hours)
Structure and function of carbohydrates (4 hours)
Structure and function of nucleotides and acids nucleic (2 hours)
Structure and function of lipids (3 hours)
Biological membranes, membrane proteins and transport (2 hours)
Signal transduction; receptors coupled to G proteins and receptors with tyrosine kinase activity; second messengers (2 hours)
General aspects of metabolism. Principles of bioenergetics and ATP production; catabolic and anabolic pathways; mechanisms of control in metabolic pathways (2 hours)

Metabolism of carbohydrates. Glycolysis; metabolic fate of pyruvic acid: lactic acid and alcohol fermentation, acetyl-CoA oxidation; gluconeogenesis pathways; phosphate pentose pathway; synthesis and degradation of glycogen (5 hours)
Metabolism regulation (2 hours)
Citric acid cycle, glyoxylate cycle (2 hours)
Lipid Catabolism: fatty acid oxidation; fate of propionyl-CoA; ketone bodies (2 hours)
Amino acid oxidation. Metabolic fate of aminic groups, nitrogen excretion and urea cycle (2 hours)
Oxidative phosphorylation, electron-transfer reactions in mitochondria; ATP synthesis (4 hours)

TEACHING METHODS

The course consists of 56 hours of lessons in classrooms and 12 hours of practical activity (4 hours in a computer class, working in single internet access for 2 guided tutorials on public websites; 8 hours will be conducted in laboratory working in groups of 2 or 3 students)

EVALUATION METHODS

The examination is oral and consists of a series of questions to verify the student knowledge about the topics studied at lessons and during the practical activity. The practical activity is evaluated on the basis of a written report that must be presented at least ten days before the examination.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

D.L Nelson, M.M. Cox, *I principi di Biochimica di Lehninger*, Zanichelli
D. Voet, J.G. Voet, C.W. Pratt, *Fondamenti di Biochimica*, Zanichelli

The students who bought textbooks from Zanichelli might activate and have access to their resources at the website:
https://my.zanichelli.it/myzanichelli
Additional materials on protein structures can be found at:
http://www.biology.arizona.edu/biochemistry/problem_sets/aa/aa.html
http://www.wf-page.net/jewampler-uga/tutorial/prot0.html
http://pdb101.rcsb.org/

INTERACTION WITH STUDENTS

At the beginning of the course, the teacher presents the objectives, program, methods of verification and the textbooks available in the library. By the end of the first month of lessons, the teacher collects the list of the students who intend to attend the laboratory activities with name, identification number and e-mail. It will be not possible to attend laboratory activities without previous reservation.

Usually, the students are received on Tuesdays (5-7.30 pm, Room 2A233, 2nd floor). For other appointments, the teacher can be contacted by e-mail or phone.

EXAMINATION SESSIONS (FORECAST)[1]

26/06/19; 8/07/19; 22/07/19; 9/09/19; 23/09/19; 7/10/19; 16/12/19; 10/2/20; 2/3/20

SEMINARS BY EXTERNAL EXPERTS SI □ NO □ X

FURTHER INFORMATION

[1] Subject to possible changes: check the web site:
https://unibas.esse3.cineca.it/ListaAppelliOfferta.do;jsessionid=E1DA946552FCFBAE6CBF69A8000275CF.esse3-unibas-prod-02

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