

COURSE: **General Biochemistry and Enzymology**

ACADEMIC YEAR: **2016/2017**

TYPE OF EDUCATIONAL ACTIVITY: **Basic**

TEACHER: **Dr. Rocco Rossano Ph.D**

e-mail: **rocco.rossano@unibas.it**

website:

phone: **+390971 205507**

mobile (optional):

Language: **Italian**

ECTS: **9** (7 lessons and 2 tutorials/practice)

n. of hours: **80** (56 lessons and 24 tutorials/practice)

Campus: **Potenza**
Dept./School: **School of agriculture, forestry, food and environmental sciences**
Program: **Food Technology**

Semester: **I**

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The course aims to provide students with basic scientific knowledge about the molecular components of the cell, the molecular mechanisms related to the metabolism of proteins, carbohydrates and lipids, the biochemical processes associated with the production and utilization of metabolic energy, the enzymes kinetic (mechanism of action; studies of active sites; regulation of catalytic activity). In addition, great emphasis is given to the importance of diet on human health and the role of natural antioxidants and polyunsaturated fatty acids. Finally, students acquire knowledge about the purification and determination of proteins from different food matrix.

PRE-REQUIREMENTS

To the students are required a satisfactory knowledge of different concepts of general chemistry and organic chemistry already acquired.

SYLLABUS

The biological material: bio-elements and bio-molecules. The world of water. Hydrogen bonds. The hydrophobic effect and hydrophobic interactions.

Amino acids and proteins: structure and function. Carbohydrates. Lipids, fatty acids and biological membranes. Thermodynamics. Spontaneity and reversibility of the reactions. General structure of the nucleotides. The ATP and other high-energy compounds. Glycolysis from glucose and other sugars. Cellular respiration. Decarboxylation of pyruvate to acetyl-CoA. The Krebs cycle. The electron transport chain, the electrochemical gradient, ATP synthase. Shuttles. Glycogen metabolism. Pentose phosphate pathway. Gluconeogenesis. Oxidation and fatty acid synthesis. Synthesis of ketone bodies. Synthesis of cholesterol. General ways of amino acids degradation. Transamination reactions. Urea cycle. Role of mitochondria in the synthesis. Regulation of metabolism and metabolic correlations. Nutrition and health. Functional aspect of the diet. Natural antioxidants and polyunsaturated fatty acids (PUFAs), features, functions and metabolism.

Enzyme kinetics (Michaelis-Menten and allosteric enzymes). Cofactors and coenzymes. Enzyme inhibition.

Modulation of enzyme activity. Enzymes purification and assay. Laboratory: Preparation of solutions and buffers for the extraction and determination of proteins from food matrix. Enzymatic assay.

TEACHING METHODS

Lectures and laboratory activities

EVALUATION METHODS

Oral examination. Evaluation: score on 30 points

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

1. Nelson e Cox: I Principi di Biochimica di Lehninger, Ed. Zanichelli, Bologna.
2. Campbell e Farrell: Biochimica, Ed. EdiSES, Napoli.
3. Riccio: La Biochimica Essenziale, Ed. Laterza, Bari.

4. Material provided by the teacher.

INTERACTION WITH STUDENTS

Office hours (3rd floor-3ANord building):Monday from 12.00 to 13.00; Wednesday from 9:00 to 11:00 and Friday from 9:00 to 11:00. In addition, the teacher is available at all times for a contact with the students through e-mail.

EXAMINATION SESSIONS (FORECAST)¹

February 6, 2017

March 13, 2017

May 22, 2017

June 19 2017

July 25, 2017

September 15, 2017

October 16, 2017

December 15, 2017

January 16, 2018

SEMINARS BY EXTERNAL EXPERTS YES NO X

FURTHER INFORMATION

Examination panel:

Dr. Rocco Rossano (president)

Prof. Faustino Bisaccia (component)

Prof. Giuseppe Martelli (component)

Prof. Giovanni Salzano (component)

¹Subject to possible changes: check the web site of the Teacher or the Department/School for updates.