

Study Programme: Bachelor Academic Studies in Biochemistry
Course Unit Title: Intermediary Metabolism
Course Unit Code: B-301
Name of Lecturer(s): full professor, Neda Mimica-Dukić, assistant professor Nataša Simin
Type and Level of Studies: Bachelor of Science Degree
Course Status (compulsory/elective): compulsory
Semester (winter/summer): summer
Language of instruction: English
Mode of course unit delivery (face-to-face/distance learning): Face-to-face
Number of ECTS Allocated: 9
Prerequisites: None
Course Aims: (1) to provide students with knowledge of the metabolic pathways of catabolism and anabolism, their regulation and interrelation, (2) to enable students to understand mechanisms of certain enzymatic reactions, (3) to get students familiar with connection between metabolic disorders and diseases in humans and animals, (4) to introduce students to trends in biochemistry, (5) developing students' ability to apply standard chemical and biochemical experimental methods in monitoring of metabolic processes
Learning Outcomes: After successful completion of this course the student is able to: (1) demonstrate knowledge of metabolic of catabolic and anabolism pathways of, their functions in the body and interrelation, (2) demonstrate knowledge of regulation of key metabolic pathways, (3) explain the mechanisms of certain enzyme-catalyzed reactions, (4) explain the connection between metabolic disorders and diseases in humans and animals (5) apply experimental chemical and biochemical methods in monitoring of biochemical processes and analyze the experimental results
Syllabus: <i>Theory</i> Introduction to metabolism and principles of bioenergetic. Metabolism of carbohydrates (glycolysis, gluconeogenesis, glycogen metabolism, pentose phosphate pathway), regulation and energy balance. Krebs cycle. Electron-transport chain and oxidative phosphorylation. Photosynthesis. Digestion, absorption and transport of lipids. Fatty acid oxidation. Biosynthesis of fatty acids, acylglycerols and phospho- and sphingolipids. Digestion of proteins. Metabolic fate of amino group: transamination reactions, deamination and urea cycle. Decarboxylation of amino acids and physiologically active amines. Degradation of hydrocarbon skeleton of amino acids. Biosynthesis of amino acids and its regulation. Amino acids as precursor of nitrogen containing physiologically active compounds. Synthesis and degradation of porphyrins. Nucleotide metabolism Replication, transcription and translation. Integration and regulation of human metabolism. <i>Practice</i> Monitoring of glycolysis in yeast, alcoholic fermentation. Monitoring of glycolysis in muscle. Identification of Krebs cycle intermediates. Exploring process of cell respiration. Monitoring the process of oxidative phosphorylation and the influence of uncouplers. Monitoring of photosynthesis and measuring the rate of photosynthesis. Spectrophotometric determination of lipid peroxidation and the effect of antioxidants. The effect of alcohol on biological membranes. Determination of the activity of pancreatic lipases and effect of bile acids. The activity of transaminases in muscular tissue. Determination of hemoglobin in the human red blood cell hemolysate. Detecting the products of amino acids

catabolism and porphyrins in biological samples.

Required Reading:

1. Voet, D.&Voet, J. : Fundamentals of Biochemistry, John Wiley&Sons, USA, 2013
2. Nelson, D.L., Coc, M.M.: Lehninger: Principle of Biochemistry, Fifth. Eddition, WH Freeman & Company, New York, 2008.
3. Storey Keneth B., Funtional Metabolism, Regulation and Adaptation. Wiley-Liss, 2004

Weekly Contact Hours: 9

(135)

Lectures: 4 (60)

Practical work: 5 (75)

Teaching Methods: Lectures, laboratory work, desk study projects, seminar(s)

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	Final exam	points
Active class participation	5	written exam	50
Practical work	15	oral exam	10
Preliminary exam(s)		
Seminar(s)	20		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.