

FACULTY OF CHEMISTRY					
SUBJECT CARD					
Name of subject in Polish	Enzymologia				
Name of subject in English	Enzymology				
Main field of study (if applicable):	Biotechnology				
Specialization (if applicable):					
Profile:	academic				
Level and form of studies:	1 <sup>st</sup> level, full-time				
Kind of subject:	obligatory				
Subject code	BTC016018, BTC016019				
Group of courses	NO				
	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)			30		
Number of hours of total student workload (CNPS)			60		
Form of crediting			crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points			2		
including number of ECTS points for practical (P) classes			2		
including number of ECTS points for direct teacher-student contact (BK) classes			1		
<b>PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES</b> 1. Basic biology and chemistry courses 2. The ability of the basic laboratory calculations including calculations of mass and molar concentrations					
<b>SUBJECT OBJECTIVES</b> C1 Familiarization with the practical aspects of working with enzymes (isolation, purification to homogeneity, the initial molecular characterization, – N-terminus DNS labeling, -C end digestion kinetics with CPA enzyme) C2 Familiarization with the techniques used in enzymology (centrifugation, protein salting out, spectrophotometric determination of protein concentration and enzyme – FDP aldolase activity) C3 Isolation and purification rabbit muscle aldolase A C4 Learning how to label and identify N-terminal residue of the peptide					
<b>SUBJECT LEARNING OUTCOMES</b> <b>relating to knowledge:</b> PEK_W01 - knows the basic methods of enzymology PEK_W02 - has knowledge of the techniques of isolation, purification, and description of the enzymes PEK_W03 - has knowledge about determination of the protein concentration and determination of enzymatic activity <b>relating to skills:</b> PEK_U01 – can determine protein concentration using Bradford method and absorbance at 280 nm PEK_U02 – can determine specific activity of an enzyme PEK_U03 – can purify an enzyme to homogeneity from the tissue sample PEK_U04 – can use the dansyl method for identifying N-terminal amino acids PEK_U05 – can balance enzyme preparation and calculate the efficiency of the preparation					
<b>Laboratory</b>				<b>Number of hours</b>	
Lab 1	Introduction, lab safety rules; laboratory equipment (spectrophotometer, centrifuge, pH-meter, thermoblock, etc.); theory of FDP-aldolase action, enzymatic activity and			4	

	protein concentration calculations and measurements	
Lab 2	Protein concentration measurements; Bradford method; analysis of the influence of surfactants, denaturants and salts on the measurement results	4
Lab 3	Aldolase activity measurements with the hydrazine method – aldolase activity, specific activity, total activity; theory of preparation balancing. Comparison of hydrazine test with the enzymatic test. Preparation of ammonium sulphate.	4
Lab 4	Rabbit muscle aldolase A isolation and purification with the Taylor method.	4
Lab 5	Analysis of the effect of carboxypeptidase A digestion on the aldolase activity.	4
Lab 6	Peptide N-terminal residue determination – dansyl method.	4
Lab 7	Peptide N-terminal residue identification - TLC chromatography after dansyl labeling and acid hydrolysis.	4
Lab 8	Final test	2
	Total hours	30
TEACHING TOOLS USED		
N1 introduction to the experiment N2 Multimedia presentation N3 Calculations, problem solving N3 Instructions available on the E-portal platform N4 Scientific publication available on the E-portal platform		
EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end))	Learning outcomes number	Way of evaluating learning outcomes achievement
F1	PEK_W01 – PEK_W03	Final test and/or short question quizzes (according to teacher instructions presented during introduction laboratory)
F2	PEK_W01 – PEK_W03	Laboratory reports
F3	PEK_U01 – PEK_U05	Multimedia presentation
P = 3,0 if (F1+F2+F3) = 60,0 – 70,0 pts. 3,5 if (F1+F2+F3) = 70,1 – 75,0 pts. 4,0 if (F1+F2+F3) = 75,1 – 80,0 pts. 4,5 if (F1+F2+F3) = 80,1 – 85,0 pts. 5,0 if (F1+F2+F3) = 85,1 – 90,0 pts. 5,5 if (F1+F2+F3) = 90,1 – 100,0 pts.		
PRIMARY AND SECONDARY LITERATURE		
PRIMARY LITERATURE:		
[1] Laboratory manuals available on the course-specific website only to qualified students (e-portal PWR).		
[2] Set of the original papers (e-portal PWR)		
SECONDARY LITERATURE:		
[1] Jeremy M. Berg, Lubert Stryer, John L. Tymoczko, Gregory J. Gatto; BIOCHEMIA, PWN 2018		
[2] Lubert Stryer, Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto, Jr. BIOCHEMISTRY Ninth Edition 2019		
[3] Voet, D., Voet, J.G. „Biochemistry” Wiley & Sons, Inc., 3 <sup>rd</sup> edition.		
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)		
prof. dr hab. inż. Piotr Dobryszyccki		