



Subject card

Subject name and code		Applied Enzymology, PG_00058616						
Field of study		Biotechnology						
Date of commencement of studies		February 2024		Academic year of realisation of subject		2023/2024		
Education level		second-cycle studies		Subject group		Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study		Full-time studies		Mode of delivery		at the university		
Year of study		1		Language of instruction		Polish		
Semester of study		1		ECTS credits		3.0		
Learning profile		general academic profile		Assessment form		assessment		
Conducting unit		Department of Pharmaceutical Technology and Biochemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)		Subject supervisor		dr hab. inż. Iwona Gabriel				
		Teachers		dr inż. Kamila Rząd Kavya Kondaka dr hab. inż. Iwona Gabriel				
Lesson types and methods of instruction		Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
		Number of study hours	0.0	0.0	15.0	0.0	15.0	30
		E-learning hours included: 0.0						
Learning activity and number of study hours		Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours		Self-study		SUM
		Number of study hours	30	8.0		37.0		75
Subject objectives		Expanding knowledge in the field of ENZYMOLOGY						
Learning outcomes		Course outcome		Subject outcome		Method of verification		
		[K7_W02] has advanced knowledge of structure and activity of enzymes and biologically active compounds also in pharmacological context, knows basic instrumental methods of qualitative and quantitative analysis and activity studies of biomolecules		The student explains the molecular basis of enzymatic catalysis, inhibition and inactivation. The student determines the activity of enzyme preparations based on the experimental data.		[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
		[K7_K04] is aware of the need to solve problems and perform tasks, independently formulate questions to solve a given problem or task; is able to plan the execution of a larger task by dividing it into partial tasks and draw up an appropriate schedule		The student knows the basic principles of planning and conducting experimental work in the field of biochemistry and is able to perform analysis of experimental data.		[SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice		
		[K7_U02] has practical skills in commonly used biochemical methods including enzyme activity and kinetics assays, electrophoresis, western blotting, ELISA assays, fluorescence microscopy, flow cytometry		The student performs spectrophotometric measurements. The student selects chromatographic techniques useful for the separation of biomolecules. The student analyzes the composition of the protein mixture using electrophoretic techniques. The student determines the parameters of the enzymatic reaction. The student interprets the results of the experiments.		[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment		

Subject contents	As part of laboratory exercises, experimental classes are carried out covering issues related to 1) chromatographic techniques used in protein purification (Purification of beta-galactosidase from E.coli using bioaffinity chromatography) 2. electrophoretic techniques (Analysis of the effectiveness of beta-galactosidase purification using SDS -PAGE) 3. enzyme activity determination methods (trypsin and a-amylase) and 4) enzyme immobilization techniques. The seminar classes will discuss, among others: topics related to the characteristics of selected enzymes as biocatalysts, selected mechanisms of enzymatic reactions, types of enzyme inhibitors and inactivators, methods of physiological regulation of enzyme activity, enzymes in biotechnology, enzyme immobilization, clinical aspects of enzymology, basics of enzyme engineering.		
Prerequisites and co-requisites	Basic knowledge of biochemistry		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory classes	60.0%	30.0%
	Exam	60.0%	50.0%
	Seminar	60.0%	20.0%
Recommended reading	Basic literature	L. Stryer Biochemistry (III-rd edition), PWN Warsaw 2002,  R.K. Murray, Harpers biochemistry, PZWL, Warsaw, 2018, ed.VII	
	Supplementary literature	G. L Peterson Methods in Enzymology Vol. 91, Academic Press, New York (1983)  E. L. V. Harris and S. Angal Protein purification methods; a practical approach, Oxford University Press, Oxford 1989  Scopes, R. K., Protein purification, Springer Verlag, New York 1987  R. L. Dryer, G. F. Lata Experimental Biochemistry, Oxford University Press, New York, 1989	
	eResources addresses	Adresy na platformie eNauczanie: Enzymologia stosowana 23/24 - Moodle ID: 37391 <a href="https://enauzanie.pg.edu.pl/moodle/course/view.php?id=37391">https://enauzanie.pg.edu.pl/moodle/course/view.php?id=37391</a>	
Example issues/ example questions/ tasks being completed	Enzymes as catalysts. The concept of substrate specificity. Basic elements of enzyme structure and molecular basis of enzymatic catalysis. Active Center. Transition State Theory. Strategy and tactics in enzyme purification. Chemical and spectral methods of studying the enzyme active site . Enzyme kinetics. Inhibition and inactivation. Molecular mechanisms of enzymatic reactions. Types of enzyme inhibitors and inactivators. Methods of physiological regulation of enzyme activity.		
Work placement	Not applicable		