



## Subject card

Subject name and code	Enzymology, PG_00048905						
Field of study	Biotechnology						
Date of commencement of studies	February 2022	Academic year of realisation of subject			2021/2022		
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			4.0		
Learning profile	general academic profile	Assessment form			exam		
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 hab. inż. Iwona Gabriel dr inż. Kamila Rząd					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	15.0	60
	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	60	5.0		35.0	100	
Subject objectives	Broadening the knowledge of the Enzymology field						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_K03	Student identifies basic classes of the enzymes. Recognizes the properties of enzymes as biocatalysts. Describes the importance of enzymes in biotechnology and medicine.			[SK5] Assessment of ability to solve problems that arise in practice		
	K7_U02	The student determines the activity of enzyme preparations based on experimental data.			[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
	K7_W02	Explains the molecular basis of enzyme catalysis, inhibition and inactivation. Recognizes the methods of structure determination, chemical and spectral methods of the active site testing. Specifies the methods of physiological regulation of enzyme activity.			[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge		

Subject contents	<p>LECTURE General characteristics of enzymes. Enzymes as catalysts. Classification and nomenclature. The specificity of the enzyme activity. Mono- and oligomeric enzymes. Cofactors. The basic elements of the structure enzymes and the molecular basis of enzymatic catalysis. Active center. The theory of induced fit. Transition state theory. Strategy in the enzyme purification. Selecting the source of the enzyme. Homogenization. Separation methods. Control of the purification process. Methods for determining the structure of the enzyme. Determination of the molecular weight. Determination of amino acid composition. Determination of the 3D structure. Chemical and spectral methods for analyzing the active center of the enzyme. Enzyme kinetics. inhibition and inactivation. Molecular mechanisms of enzymatic reactions. Types of enzymes inhibitors. Methods for physiological regulation of enzyme activity. Rybozymes.</p> <p>LABORATORY 1. Purification of beta-galactosidase from E. coli by bioaffinity chromatography. 2. Analysis of the effectiveness of purification of beta-galactosidase by SDS-PAGE 3. The methods for determination of trypsin activity 4. Study of the influence of temperature, pH, activators and inhibitors on the activity of alpha-amylase 5. Immobilization of alpha-amylase.</p> <p>SEMINAR Bioaffinity chromatography on monolithic supports. Transaminases for chiral amine synthesis. The structure and function of Saccharomyces cerevisiae proteinase A. Glucosamine-6-phosphate synthase the multi-facets enzyme.</p>														
Prerequisites and co-requisites	Basic knowledge of biochemistry														
Assessment methods and criteria	<table border="1" data-bbox="448 786 1487 920"> <thead> <tr> <th data-bbox="448 786 794 819">Subject passing criteria</th> <th data-bbox="794 786 1141 819">Passing threshold</th> <th data-bbox="1141 786 1487 819">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 819 794 853">laboratory</td> <td data-bbox="794 819 1141 853">60.0%</td> <td data-bbox="1141 819 1487 853">30.0%</td> </tr> <tr> <td data-bbox="448 853 794 887">Exam</td> <td data-bbox="794 853 1141 887">60.0%</td> <td data-bbox="1141 853 1487 887">50.0%</td> </tr> <tr> <td data-bbox="448 887 794 920">test</td> <td data-bbox="794 887 1141 920">60.0%</td> <td data-bbox="1141 887 1487 920">20.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	laboratory	60.0%	30.0%	Exam	60.0%	50.0%	test	60.0%	20.0%
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Recommended reading	<p>Basic literature</p> <p>Supplementary literature</p> <p>eResources addresses</p>	<p>1. L. Stryer Biochemistry (III-rd edition), PWN Warsaw 2002, 2. R.K. Murray, Harpers biochemistry, PZWL, Warsaw, 1995 3. G. L Peterson Methods in Enzymology Vol. 91, Academic Press, New York (1983) 4. E. L. V. Harris and S. Angal Protein purification methods; a practical approach, Oxford University Press, Oxford 1989 5. Scopes, R. K., Protein purification, Springer Verlag, New York 1987 6. R. L. Dryer, G. F. Lata Experimental Biochemistry, Oxford University Press, New York, 1989 7. P. Kafarski, B. Lejczak Bioorganic chemistry, PWN Warasaw 1994,</p> <p>Not applicable</p>													
Example issues/ example questions/ tasks being completed	<p>General characteristics of enzymes. Enzymes as catalysts. Classification and nomenclature. Specificity enzyme activity. Mono- and oligomeric enzymes. Cofactors. The basic elements of the structure of enzymes and The molecular basis of enzymatic catalysis. Active center. The theory of induced fit. Transition state theory. Control of the purification process. Methods for determining the structure of the enzyme. Determination of the molecular weight. Determination of amino acid composition. Determination of the spatial structure. Chemical and spectral methods for analyzing the active center of the enzyme. Enzyme kinetics. inhibition and inactivation. Molecular mechanisms of enzymatic reactions. Methods for physiological regulation of enzyme activity. Enzymes in biotechnology.</p>														
Work placement	Not applicable														