



Subject card

Subject name and code	Molecular Immunology, PG_00058266						
Field of study	Biotechnology						
Date of commencement of studies	February 2024		Academic year of realisation of subject		2024/2025		
Education level	second-cycle studies		Subject group		Optional subject group 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	2		ECTS credits		2.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Katedra Biotechnologii i Mikrobiologii -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Lucyna Holec-Gąsior				
	Teachers		dr hab. inż. Lucyna Holec-Gąsior				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	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		3.0		17.0	50
Subject objectives	The aim of the course is to provide basic knowledge of molecular immunology, discuss the molecular basis of immune processes and learning the basic laboratory techniques which use the antigen-antibody reactions.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_K02] is aware of the limitations and the necessity of continuous development of knowledge and technology; understands the need for education and constant training		The student is aware of and can assess the importance of using molecular immunology techniques. Understands the limitations and benefits of their use as well as the need to acquire new knowledge and skills with the development of molecular immunodiagnostic methods.		[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work		
	[K7_U05] is able to apply instrumental methods of quantitative and qualitative analysis and studies on activity of biomolecules, select and apply diagnostic and analytical methods in the field of his/her specialty with particular emphasis on genetic, molecular and microbiological diagnostics and diagnostics based on antigen-antibody reaction		The student can rationally choose methods appropriate to carry out research tasks. Can optimize the diagnostic procedure protocol. Can use basic methods based on the antigen-antibody reaction.		[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools		
	[K7_W01] has advanced knowledge of methods of genetic engineering and molecular genetics, functioning of the immune system and mechanisms of immune system response, diagnostic methods, and analytical methods in the area of specialty		The student has basic knowledge of molecular immunology. Understands and can explain the molecular basis of immune processes. The student has knowledge of how to perform immunoidentification of a fusion protein using the dot blot method; Western blotting test using monoclonal and polyclonal antibodies and indirect and direct ELISA test.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		

Subject contents	<p>Lecture:</p> <ol style="list-style-type: none">1. B cells (control expression of genes responsible for differentiation).2. Formation of antibodies variability (organization and recombination of immunoglobulin genes, generation of variation and regulation of transcription).3. Regulation of immunoglobulin production, maturation of the immune response and antibody isotope switching.4. T cells (organization and recombination of TCR receptor genes, a mechanism of thymus education).5. Major histocompatibility complex and other systems of blood cells antigens.6. Monocytes, NK cells and dendritic cells (formation; subpopulations, receptors, mechanisms of action).7. Cytokines modifying the function of the immune system.8. Immunohematology.9. Molecular immunology of cancer.10. Molecular ground of inherited diseases of the immune system.11. Immunodetection of proteins (ELISA, dot blot, Western blot).12. Immunological techniques (isolation of pure antibodies, isolation of populations / subpopulations of lymphocytes, methods for measuring of cell effector function, migration of lymphocytes). <p>Laboratory:</p> <ol style="list-style-type: none">1. Discussion of BHP regulations. Introduction to the basic techniques of immunodiagnostic.2. Immunoidentification of fusion protein using the dot blot method.3. Western blotting test with the use of a monoclonal antibody and a polyclonal rabbit serum.4. Direct ELISA assay titration of antigen and antibodies.5. Indirect ELISA assay detection of specific antibodies in the sera of animal with toxoplasmosis.		
Prerequisites and co-requisites	Knowledge of immunology and molecular biology.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	final test at the end of the laboratory	60.0%	20.0%
	laboratory report	60.0%	20.0%
	final test at the end of lectures	60.0%	60.0%
Recommended reading	Basic literature	<ol style="list-style-type: none">1. Roitt I., Brostoff J., Male D. Immunology, Medical Publisher PZWL, Warsaw, 20082. Gołab J., Jakóbisiak M., Lasek W., Stokłosa T. Immunology, PWN. Warsaw, 20123. Ryba M. Molecular immunology textbook for students of biotechnology. AMG, Gdansk, 2008.4. Węgleński P. Molecular genetics, PWN, Warsaw, 1998.5. Drewa G., Ferenc T. Medical genetics. Handbook for Students, Elsevier, 2011	
	Supplementary literature	<ol style="list-style-type: none">1. Senatorski G. Clinical Immunology, Czelej, Lublin , 20092. Stryer L. Biochemistry. PWN. Warsaw, 2009	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none">1. Methods for the immunodetection of proteins.2. Control of the expression of genes involved in B cell differentiation.3. Formation of antibodies variability and regulation of immunoglobulin production.4. Organization and recombination of TCR receptor genes.5. Major histocompatibility complex and other systems of blood cells antigens.6. Immunological techniques.		
Work placement	Not applicable		