GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	VIRUSOLOGY, PG_00065567		
Field of study	Biotechnology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Optional subject group Specialty 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	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Laboratorium Biotechnologii i Mikrobiologii -> Department of Biotechnology and Microbiology -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Beata Zalewska-Piątek	
	Teachers	dr hab. Beata Zalewska-Piątek dr hab. inż. Marta Wanarska	

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	0.0	45

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	45	5.0	40.0	90

Subject objectives

The aim of the Virology course is to provide contemporary knowledge about viruses, their molecular biology based on the latest research. The course program includes general information about the properties and classification of viruses, their replication, multiplication in the laboratory, pathogenicity and virulence, and evasion of immune resistance. Additionally, contemporary approaches to the diagnosis and treatment of viral infections are characterized.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W06] recognizes the technological and scientific, as well as organizational and economic opportunities and limitations in biotechnology and related fields	The student analyzes selected viral vaccines available on the market in the context of protecting the health and life of the human population.	[SW3] Assessment of knowledge contained in written work and projects
[K7_U06] plans research and designs biotechnological products and processes taking into account legal regulations and bioethical principles	The student analyzes the properties of viruses, their replication, multiplication in the laboratory, mechanisms of pathogenicity, virulence and evasion of immune resistance.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
[K7_K02] is aware of the potential risks and opportunities associated with the development of science and technology for the natural environment and society	The student describes contemporary approaches to the diagnosis and treatment of viral infections (available antiviral drugs, sera and vaccines) and selected human viral disease syndromes	[SK3] Assessment of ability to organize work [SK2] Assessment of progress of work

Subject contents	Definition of viruses, classification and nomenclature (taxonomy). Phylogeny and morphology of viruses. Viral disease syndromes. Replicative life cycle of viruses (DNA, RNA viruses of positive and negative polarity). Diversity of the genetic structure of viruses. Pathophysiology of viral infections. Pathogenicity and virulence. Routes of infection and spread of viruses in the host organism. Course of viral diseases (short-term acute viral infections, acute latent infections, lethal infections, non-acute infections). Excretion of viruses from the site of primary infection or target organs of the host. Defense mechanisms of viruses. Methods of multiplication (semi-continuous and continuous cell lines, organ cultures, multiplication of viruses in chicken embryos, cloning of viral genes) and detection of viruses (cytopathic effect, plaque method, viral hemagglutination, hemadsorption, in situ hybridization, viral interference). Laboratory diagnostics of viral infections. Methods of rapid diagnostics of viruses and their antigens (serological, molecular, microscopic and classical). Isolation of viruses in cell culture. Detection of specific antiviral antibodies. Intrauterine and perinatal viral infections. Pathogenesis of fetal viral infections. Immunological resistance of the fetus to infection. Rubella, cytomegalovirus disease, generalized herpes, chickenpox and herpes zoster, AIDS, hepatitis B. Basic mechanisms of immunity to viral infections. Immunological antiviral immunity (nonspecific, innate and specific defense mechanisms). Evasion of immune defense mechanisms by viruses. Harmful immune responses. Viral infections in people with immunodeficiencies. Types of immune deficiencies. Primary and secondary immunodeficiencies. Influenza virus and influenza. Identification of the etiological agent of influenza, epidemics and pandemics. Influenza virus types, antigenic differences, nomenclature and genetic variability. Routes of infection and clinical course of influenza. Laboratory diagnostics. Influenza vaccines. Antiviral drugs. Epidemiological and virological surveillance system for influenza. LABORATORY Bacterial polymeric adhesion systems as carriers of heterologous antigenic determinants glycoprotein D of the Herpes simplex virus and Dr fimbriae of E. coli strains. Isolation of native and chimeric Dr and Dr-HSV fimbriae from the surface of bacterial cells, purification and dialysis. Electrophoretic separation of protein samples. Immunoidentification of proteins by Western blotting (electrotransfer, detection based on polyclonal anti-Dr antibodies and monoclonal anti-HSV antibodies). Exercises 1 and 2. Multiplication of modified bacteriophage M13 in bacterial cells. Transformation of E. coli JM101 strain cells with DNA of phage vector M13mp18 with a fragment of the lac operon. Analysis of phage plaques on agar medium. Isolation of genetic material of modified phage M13 in the form of double-stranded DNA. Exercises 3 and 4. Final colloquium. Exercise 5.
Prerequisites and co-requisites	Fundamentals of molecular biology and immunology.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture evalution includes the grades from oral exam	60.0%	50.0%
Laboratory evaluation includes evaluation for the written test and the classes activity.	60.0%	50.0%

Recommended reading	Basic literature	1. Molecular Virology. L. Collie, J. Oxford. Translation edited by M. Łuczak. PZWL Medical Publisher, 2001. 2. Fundamentals of molecular virology. A. Piekarowicz. Scientific Publishers OWN, 2004. 3. Immunology. I. Roitt, J. Brostoff, D. Male. Translation edited by J. Żeromski. Medical Publisher Słowinski Verlag. 2000. 4. The Bacteriophages, edited by Richard Calendar, Oxford University Press 2006.
	Supplementary literature	Basic Virology. E.K. Wagner i M.J. Hewlett. Blackwell Publishing 2004.
	eResources addresses	Adresy na platformie eNauczanie: Wirusologia - wykład 2024/2025 Biotechnoloia II stopień - Moodle ID: 42794 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=42794 Wirusologia - new laboratorium - 2024/2025 Biotechnologia II stopień - Moodle ID: 42795 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=42795
Example issues/ example questions/ tasks being completed	Diagnostic methods for identifying viruses. Immune resistance to viral infections. Characteristics of the influenza virus.	
Work placement	Not applicable	

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