

Subject card

Subject name and code	Molecular diagnostics, PG_00082035						
Field of study	Chemistry						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study 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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		1.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	Laboratory of Bionanotechnology -> Department of Molecular Biotechnology -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Agnieszka Żylicz-Stachula				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	Aims of the course: - acquainting students with all issues mentioned in the lecture's program content - acquainting students with modern methods used in molecular diagnostics - acquainting students with the current possibilities, limitations and the anticipated trends in modern molecular diagnostics						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_U02] Performs analyses using experimental methods and draws conclusions based on them.	Using the knowledge gained during the course, the student analyzes the diagnostic test results conducted during the laboratory exercises. Drawing on the knowledge acquired during the course, the student formulates conclusions based on the diagnostic test results.	[SU2] presentation/project/paper/report
	[CHEML3_W04] Characterises the basic methods of chemical compound analysis.	Student lists, characterizes and understands the methods used in molecular diagnostics, including PCR, qPCR, TR PCR, dPCR, DNA sequencing techniques, genomic analysis methods, DNA polymorphism testing methods, hybridization and immunological techniques. Student lists and describes exemplary applications of modern technologies used in medical diagnostics and forensic medicine. Student lists and describes exemplary applications of modern techniques used for detection and identification of microorganisms.	[SW4] test/exam - oral or written
	[CHEML3_K04] Respects and appreciates the importance of intellectual property in her/his actions and in the actions of others; acts ethically.	The student understands the need for continuous education. The student exercises caution and critical thinking when expressing opinions. The student respects intellectual property and correctly cites sources used in preparing essays or presentations. The student recognizes and appreciates the opportunities provided by modern molecular diagnostics. The student values and discusses the importance of screening tests in medical prevention.	[SK2] presentation/project/paper/report
	[CHEML3_K02] Works individually demonstrating initiative and independence of activity and cooperates in a team fulfilling various roles in it.	The student independently plans a molecular diagnostic experiment using PCR techniques. The student can analyze examples of DNA sequencing data, identifying genetic mutations and their potential clinical implications. The student collaborates in a team to prepare a joint scientific presentation on a selected, commercially available diagnostic test.	[SK1] oral statement/conversation/discussion [SK2] presentation/project/paper/report [SK8] observation of student's independent or team work
	[CHEML3_U07] Prepares documented elaboration on a specific problem in the field of selected chemical and physical issues.	Student lists and describes examples of commercially available diagnostic tests.	[SU2] presentation/project/paper/report
	[CHEML3_W10] Enumerates and describes the basic aspects of the construction, operation and use of measuring apparatus and equipment used in experimental works in the field of chemistry and related sciences.	Student lists and characterizes laboratory equipment used in molecular diagnostics.	[SW4] test/exam - oral or written

Subject contents	Techniques for isolation, separation and sequencing of nucleic acids. Methods for genome analysis. Screening methods for detection of point mutations. Immunological and molecular hybridization detection techniques. DNA microarrays. Molecular diagnostics of microorganisms. Molecular diagnostics of inherited diseases. Molecular diagnostics in oncology. Selected laboratory equipment and methods used in medical diagnostics and forensic medicine.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	51.0%	52.0%
	activity during scientific discussion	0.0%	20.0%
	presentation	0.0%	28.0%
Recommended reading	Basic literature	Buckingham, M.L.; Molecular diagnostics: Fundamentals, Methods and Clinical Applications. F.A. Davis Company, 2019 Bal, J. Genetyka medyczna i molekularna. Wydawnictwo Naukowe PWN, wyd. V, Warszawa, 2023 Rutkowski, P., Kubiowski, T., Tysarowski, A., Krzakowski M., Wasąg, B., Gierczyński, J., Kaczor, M., Fałek, A., Jakubiak, K. Diagnostyka molekularna w leczeniu nowotworów. Raport. Modern Healthcare Institute, Warszawa 2023	
	Supplementary literature	Selected scientific publications and review papers in Polish and English (updated annually and available online), provided by the instructor during the semester in which the course is conducted.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	The PCR technique that utilizes the activity of reverse transcriptase is: a) real time PCR b) RT-PCR c) ddPCR d) nested PCR. Complete the sentence: "The name FISH is an abbreviation of the full name of the diagnostic technique, otherwise known as"		
Work placement	Not applicable		

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