

Subject card

Subject name and code	Molecular diagnostics, PG_00082036						
Field of study	Chemistry						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2028/2029		
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	0.0	0.0	15.0	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	The course aims to provide students with practical knowledge and skills in selected techniques used in molecular diagnostics and to prepare students for work in a diagnostic laboratory.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[CHEML3_U02] Performs analyses using experimental methods and draws conclusions based on them.	The student performs swabbing and isolation of genomic DNA. The student performs DNA amplification by PCR. The student performs PCR product mapping using restriction endonucleases. The student analyses the products of PCR reactions and DNA digestion with restriction enzymes using electrophoretic techniques. The student investigates the polymorphism of the gene encoding alcohol dehydrogenase using the Cleaved Amplified Polymorphic Sequence (PCR-CAPS) method and concludes. The student determines the concentration and purity of the DNA solution by spectrophotometric methods.	[SU2] presentation/project/paper/report [SU6] demonstration of practical skills [SU8] observation of student's independent or team work
	[CHEML3_W04] Characterises the basic methods of chemical compound analysis.	The student describes electrophoretic techniques used in molecular diagnostics. The student describes spectrophotometric methods used in molecular diagnostics. The student describes nucleic acid analysis techniques used in molecular diagnostics.	[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.	Students knows the principles of citation and use of literature and source materials in research papers. The student knows and understands the basic principles of intellectual property rights, including copyrights and patents.	[SK2] presentation/project/paper/report
	[CHEML3_U07] Prepares documented elaboration on a specific problem in the field of selected chemical and physical issues.	The student prepares a detailed report on the molecular analyses conducted and interprets the results.	[SU2] presentation/project/paper/report
	[CHEML3_K02] Works individually demonstrating initiative and independence of activity and cooperates in a team fulfilling various roles in it.	Student works in groups, performing laboratory exercises according to instructions. Student works individually, preparing a report of the performed experiments. The student interpretes independently the results of the molecular analyses performed.	[SK2] presentation/project/paper/report [SK8] observation of student's independent or team work
	[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.	The student lists and describes the operation and uses of a thermocycler, UV-Vis spectrophotometer, transilluminator, and agarose electrophoresis apparatus.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion
Subject contents	Molecular diagnostics of the variants of the human alcohol dehydrogenase gene. Isolation of nucleic acids from self-prepared swabs. Amplification of the gene using PCR technology. Separation of the obtained PCR products by agarose gel electrophoresis. The interpretation of the diagnostic test.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	raport	30.0%	50.0%
	test with open questions	51.0%	50.0%

Recommended reading	Basic literature	Czech E, Hartleb M, Polimorfizm genetyczny dehydrogenazy alkoholowej znaczenie patofizjologiczne, <i>Advances in Clinical and Experimental Medicine</i>, 2003, 12, 801809 Cichoż-Lach H, Partcka J, Nesina I, Celiński K, Słomka M, Wojciorowski J, Genetic polymorphism of alcohol dehydrogenase 3 in alcohol liver cirrhosis and in alcohol chronic pancreatitis. <i>Alcohol and Alcoholism</i> vol 41, no1 pp 14-17, 2006 Łaniewska-Dunaj M, Jelski W, Szmitkowski M, Dehydrogenaza alkoholowa-znaczenie fizjologiczne i diagnostyczne. <i>Postepy Hig Med Dosw.</i>, 2013; 67:901-907 Pöschl G, Stickel F, Wang XD, Seitz H, Alcohol and cancer: genetic and nutritional aspects. <i>Proceedings of the Nutrition Society</i> (2004), 63, 65-71 Sekuencja ludzkiej dehydrogenazy alkoholowej klasy I, podjednostki gamma (ADH3): http://www.ncbi.nlm.nih.gov/nuccore/M12272.1 .A.2. studiowana samodzielnie przez studenta poz. 5, 6
	Supplementary literature	Diagnostyka molekularna z zastosowaniem techniki PCR : ćwiczenia laboratoryjne / Beata Krawczyk [et al.]. Wydawnictwo Politechniki Gdańskiej, 2012.
	eResources addresses	
Example issues/ example questions/ tasks being completed	List the components of the PCR reaction. Which of the following dyes is not used to visualise DNA in a gel after UV light exposure? a) Gel Red b) Ethidium bromide c) EndoR-Stop d) SybrGreen	
Work placement	Not applicable	

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