University of Gdańsk

Subject card

Subject name and code	Molecular diagnostics, PG_00082036		
Field of study	Chemistry		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	Bachelor's studies	Subject group	Obligatory subject group 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 interperates 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, Advances in Clinical and Experimental Medicine, 2003, 12, 801809 Cichoż-Lach H, Partcka J, Nesina I, Celiński K, Słomka M, Wojcierowski J, Genetic polymorphism of alcohol dehydrogenase 3 in alcohol liver cirrhosis and in alcohol chronic pancreatitis. Alcohol and Alcoholism vol 41, no1 pp 14-17, 2006 Łaniewska-Dunaj M, Jelski W, Szmitkowski M, Dehydrogenaza alkoholowa-znaczenie fizjologiczne i diagnostyczne. Postepy Hig Med Dosw., 2013; 67:901-907 Pöschl G, Stickel F, Wang XD, Seitz H, Alcohol and cancer: genetic and nutritional aspects. Proceedings of the Nutrition Society (2004), 63, 65-71Sekwencja 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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