University of Gdańsk

Subject card

Subject name and code	Molecular diagnostics, PG_00082035		
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 During the course, elements in English are used (animations reinforcing the program content, excerpts from lectures/statements by experts in the field, and educational films).
Semester of study	5	ECTS credits	1.0
Learning profile	academic	Assessment form	
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_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
[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_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_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_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_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

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
presentation	0.0%	28.0%
activity during scientific discussion	0.0%	20.0%
test	51.0%	52.0%

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., Kubiatowski, 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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