



## Subject card

Subject name and code	Molecular Diagnostics in Medicine and Food Industry, PG_00039037						
Field of study	Biotechnology						
Date of commencement of studies	February 2022	Academic year of realisation of subject			2022/2023		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study 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			2.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Microbiology -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Beata Krawczyk				
	Teachers		dr hab. Beata Krawczyk				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	E-learning hours included: 0.0						
DIAGNOSTYKA MOLEKULARNA W MEDYCYNIE I PRZEMYSŁE SPOŻYWCZYM- 2022-2023 - Moodle ID: 24049 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24049">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24049</a>							
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	30	6.0	14.0	50		
Subject objectives	The aim of the course is to acquaint the student with molecular methods, applied for medical diagnosis and food industries, overview the achievements and tools of molecular biology in the diagnosis, overview news of the diagnostics market.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_U03	The student is aware that microorganisms and their structural elements / enzymes can be used in the construction of diagnostic tests			[SU2] Assessment of ability to analyse information		
	K7_K02	Knowledge of the organization of the laboratory in which he works with molecular methods, advantages and disadvantages of molecular methods, Student understand the necessity of introduce the new solutions in the molecular diagnostics.			[SK2] Assessment of progress of work [SK3] Assessment of ability to organize work		
	K7_U11	Student is able to select and apply analytical and diagnostic methods in the field of their specialization with particular focus on molecular diagnostics Student is able to analyze the results of the experiment			[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment		
	K7_W12	Knowledge of technical aspects of molecular methods, sensitivity and specificity of tests and the principles of their creation. Application of molecular methods in various medical and biotechnology specialties. The student is able to answer who can be a diagnostician and what tools he can use.			[SW1] Assessment of factual knowledge		

Subject contents	<p>Lectures:</p> <ul style="list-style-type: none"> <li>• Personalized medicine - definition; Laboratory Diagnostics Act. Who can work in laboratory diagnostic? Range of molecular diagnostic applications in medicine and food industry. The most important discoveries that have been used in molecular diagnostics. Rules for the introduction of new diagnostic assays on the market. Guidelines for safe work practices in human and animal medical diagnostic laboratories. Diagnostic criteria for validation method. Collection, storage and transport of samples.</li> <li>• Nucleic acid hybridization techniques and application in microbiology, in diagnosis of genetic diseases and cancer (hybridization in solution and on a solid, probe selection, hybridization formats, reverse hybridization, elements of cytogenetics and hybridization <i>in situ</i> (FISH techniques), DNA microarrays, elements of transcriptomics).</li> <li>• Screening methods for detection of point mutations and polymorphisms in DNA (SCCP, DGGE, TGGE, RFLP-PCR, PCR-RFLP, next-generation sequencing, hybridization).</li> <li>• What is the epidemiology? Molecular methods in epidemiology. Detection of infection, identification of species and typing of bacterial strains using the classical and molecular techniques (phage typing, typing bacteriocins, plasmid profile analysis, pulse field gel electrophoresis REA-PFGE, DNA fingerprinting methods). The criteria for selecting methods and criteria for the interpretation of genetic patterns in epidemiological studies.</li> <li>• Molecular diagnostics in virology – detection of blood-borne viruses. Immunodiagnosics, nucleic acid detection, of HCV, HBV, HIV, CMV. Application of Real-time PCR in the microbiological analysis (food and biopharmaceuticals).</li> <li>• Biosensors in diagnostic</li> <li>• Proteomics in the diagnosis of genetic diseases and cancer.</li> </ul> <p>Laboratory: Simplex PCR. Identification of the species <i>E. faecalis</i> and <i>E. faecium</i> by PCR; Application of multiplex PCR for identification of <i>Staphylococcus aureus</i>, and the <math>\beta</math>-lactam antibiotics resistance. 3. Amplification of the human CCR5 gene - the detection of deletions <math>\Delta</math>32pz-resistance to HIV infection. Isolation of the human DNA and Sex determination by polymerase chain reaction (PCR) analysis of the X-Y homologous amelogenin gene. DNA genotyping of bacterial strains.</p>											
Prerequisites and co-requisites	<p>Pass exams: Microbiology, Molecular biology,</p> <p>additionally: General immunology</p>											
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 1079 794 1108">Subject passing criteria</th> <th data-bbox="799 1079 1137 1108">Passing threshold</th> <th data-bbox="1142 1079 1481 1108">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1115 794 1144">lecture- exam- written test</td> <td data-bbox="799 1115 1137 1144">60.0%</td> <td data-bbox="1142 1115 1481 1144">50.0%</td> </tr> <tr> <td data-bbox="456 1151 794 1180">report, written test</td> <td data-bbox="799 1151 1137 1180">60.0%</td> <td data-bbox="1142 1151 1481 1180">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	lecture- exam- written test	60.0%	50.0%	report, written test	60.0%	50.0%
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Recommended reading	<p>Basic literature</p> <p>Supplementary literature</p> <p>eResources addresses</p>	<p>Diagnostyka molekularna w mikrobiologii. B.Krawczyk, J.Kur. Wydawnictwo PG.2008. •Biologia molekularna w medycynie. Elementy genetyki medycznej. Pod red. Jerzy Bał; PWN W-wa 2008. •Genetyka medyczna. L.B. Jorde, J.C. Carey, M.J. Bamshad, R.L. White. Redakcja naukowa wydania polskiego Jacek Wojciorowski. Lublin 2002. •Genomy. T.A. Brown. Przekład P. Węgleński. PWN W-wa 2001. •PCR Application Manual. 2006. Roche Diagnostics GmbH, Mannheim (<a href="http://www.roche-applied-science.com">www.roche-applied-science.com</a>) •Analiza DNA - teoria i praktyka pod red. Ryszarda Słomskiego Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu. 2008. •Diagnostyka molekularna z zastosowaniem techniki PCR. Krawczyk B. i in. Wyd. PG-2012 Podstawy techniki PCR – ćwiczenia laboratoryjne. Wyd. PG 2012.</p> <p>Analiza DNA teoria i praktyka pod red. Ryszarda Słomskiego Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu. 2008. Edited by G.Patrinós, W. Ansoorge " Molecular diagnostics"</p> <p>artykuły ze strony <a href="http://www.ncbi.nlm.nih.gov/pubmed/">http://www.ncbi.nlm.nih.gov/pubmed/</a></p>										
Example issues/ example questions/ tasks being completed	<p>Molecular diagnostic methods for the detection of HIV</p> <p>Molecular epidemiology - studies of short-term epidemics and pandemics</p>											
Work placement	Not applicable											