

**Subject card**

<b>Subject name and code</b>	Systems biology, PG_00203480						
<b>Field of study</b>	Medical Biology						
<b>Date of commencement of studies</b>	October 2026	<b>Academic year of realisation of subject</b>			2027/2028		
<b>Education level</b>	Master's studies	<b>Subject group</b>			Obligatory subject group in the field of study		
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	2	<b>Language of instruction</b>			Polish		
<b>Semester of study</b>	3	<b>ECTS credits</b>			3.0		
<b>Learning profile</b>	academic	<b>Assessment form</b>			exam		
<b>Conducting unit</b>	Department of Evolutionary Genetics and Biosystematics -> Faculty of Biology -> Rector						
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr Agnieszka Kaczmarczyk-Ziemba				
	<b>Teachers</b>						
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	<b>Number of study hours</b>	30		4.0		41.0	75
<b>Subject objectives</b>	<ol style="list-style-type: none"> <li>1. Learning about the diversity and complexity of the organism, and the scientific disciplines and methods needed to analyse them.</li> <li>2. Education towards a holistic view of the human body.</li> </ol>						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BIOLMEDMU2_W04] knows in-depth understanding the principles of planning research based on the achievements of biological and medical sciences, the principles of operation of equipment and apparatus used in medical biology research, and the principle of interpreting biological phenomena and processes based on empirical data in research work and practical activities	Knows the common techniques used to analyse proteins, genes and metabolites, knows how to assign a research task to an appropriate omics (proteomics, metabolomics or genomics)	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion
	[BIOLMEDMU2_U01] can proficiently, but critically, use the scientific literature and databases necessary in the activities of medical biology and related disciplines	Can make proficient, but critical use of scientific literature, both in Polish and English language, necessary in the field of systems biology	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written [SU5] implementation of a problem task
	[BIOLMEDMU2_U02] is able to plan and conduct experiments and measurements based on advanced research techniques and tools, is able to interpret the obtained results and draw conclusions	The student is able to plan experiments based on advanced techniques and research tools, is able to interpret the obtained results and draw conclusions	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written [SU5] implementation of a problem task
	[BIOLMEDMU2_K02] is ready to recognize the importance of knowledge in solving cognitive and practical problems and to seek expert advice when having difficulty solving a problem on his own	Recognises the importance of knowledge in solving cognitive and practical problems and consults experts when having difficulty solving a problem independently	[SK8] observation of student's independent or team work
	[BIOLMEDMU2_W01] has an in-depth knowledge of scientific fields and disciplines relevant to medical biology and the studied specialty and knows their main development trends	Has an in-depth knowledge of scientific fields and disciplines relevant to systems biology and is familiar with its main developments	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion
	[BIOLMEDMU2_U03] is able to formulate and solve problems on the basis of the known laws and methods, including - using computer tools and statistical methods	The student is able to formulate and solve problems based on known issues concerning systems biology	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written [SU5] implementation of a problem task
	[BIOLMEDMU2_W02] is oriented to the currently debated problems in medical biology and related disciplines	Is familiar with currently debated issues in the field of systems biology and personalised medicine	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion
	[BIOLMEDMU2_K07] is ready to formulate opinions on various aspects of professional activities	Is prepared to form opinions on various aspects of the professional activities	[SK8] observation of student's independent or team work
Subject contents	Cellular theory. Holistic-systemic medicine and personalized therapies. Properties of model complex networks. Systems biology as a new scientific field encompassing interdisciplinary issues. Omics approaches in systems biology (e.g. genomics, epigenomics, nutrigenomics, transcriptomics, proteomics). Biomarkers - definition and division. Integration of omics issues to select potential biomarkers. Analytical techniques, their optimisation and validation. State-of-the-art diagnostic workflows with examples of selected conditions (including cancer and neurodegenerative diseases).		
Prerequisites and co-requisites	Completion of courses covering human genetics and basic molecular biology.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	51.0%	100.0%

Recommended reading	Basic literature	<p>1. used during the classes:</p> <ul style="list-style-type: none"> <li>Kraj A., Drabik A., Silberring J. Proteomika i metabolomika, Wydawnictwa Uniwersytetu Warszawskiego (2010).</li> <li>Nalepa G. Genetyka. Wydanie III, Helion (2005). 3. Juś M. Spór o redukcjonizm w medycynie. Studium filozoficzne i metodologiczne, Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika (2014).</li> </ul> <p>2. studied independently by the student:</p> <ul style="list-style-type: none"> <li>Szczepaniak W. Metody instrumentalne w analizie chemicznej, Wydawnictwo Naukowe PWN (2008).</li> <li>Atta-ur-Rahman et al. Recent advances in analytical techniques, v. 1, Sharjah : Bentham Science Publishers Ltd. (2017).</li> <li>Walhout M., Vidal M., Dekker J. Handbook of Systems Biology. Concepts and insights. Academic Press (2020).</li> </ul>
	Supplementary literature	Current publications in Polish and English indicated by the instructor and/or retrieved independently by the student from the PubMed database
	eResources addresses	
Example issues/ example questions/ tasks being completed	<p>When sequencing on the Illumina platform:</p> <ol style="list-style-type: none"> <li>we obtain raw sequence reads of at least 1,000 nucleotides in length</li> <li>use current changes measured in the pore channel at the bottom of the reaction plate</li> <li>we use adaptor fragments that allow binding of the sequenced fragments to the reaction plate</li> <li>we use adaptor fragments that allow binding of the sequenced fragments to a bead at the bottom of the reaction plate</li> </ol>	
Work placement	Not applicable	

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