

Name of subject	MODERN RESEARCH METHODS AND TECHNIQUES			
Department conducting the subject	Doctoral School of the Silesian Medical University in Katowice, Poland			
Year II	Course	status	Elective language	Polish
Form of classes	Numbers of hours	The form of completion of classes	ECTS points	
		credit	3	
Lecture				
exercises	30			
Seminar				
Teachers	Dr hab. n o zdrowiu Anna Brzęk Dr hab. n o zdrowiu Paweł Niemiec, prof. SUM Dr hab. n o zdrowiu Grzegorz Dziubanek, prof. SUM			
Department	Department of Physiotherapy, Chair of Physiotherapy, Faculty of Health Sciences in Katowice, Medical University of Katowice Department of Biochemistry and Medical Genetics, Department of Basic Sciences, Faculty of Health Sciences in Katowice, Medical University of Katowice Department of Environmental Health Faculty of Public Health in Bytom			
The aim of course	– Gain knowledge of modern research methods, techniques and tools used in health sciences. – Acquire the ability to plan scientific development and become an independent researcher.			
Preliminary requirements	Completed second degree			
LEARNING EFFECTS				
Category	Description of the effect		Reference to effects for the program	
Knowledge	1. Knows and understands the scientific basis of modern methodology in physiotherapy and physioprophyllaxis based on EBM		P8S_WG	
	2. Understands the need for knowledge of the national and world scientific achievements indicating the use of modern methods and techniques in physiotherapy		P8U_W	
	3. Knows the strengths and weaknesses of the use of modern methods and techniques in physiotherapy in scientific research		P8S_WK	
	4. Knows and understands the scientific, including molecular, background of modern methodology in the field of medical biology.		P8S_WG	
	5. Knows the development trends in research methods used in the discipline of health sciences		P8Z_WG	
	6. Knows the methods and research tools used in health sciences, including the principles of selection and/or sampling		P8Z_WG	
skills	1. Is able to make conclusions based on the results of scientific research, the methodology of which is based on modern methods and techniques used in physiotherapy and physioprophyllaxis		P8S_UW	
	2. Is able to modify the conducted research based on modern research techniques with own modifications		P8S_UU	
	3. Is able to apply knowledge of modern molecular biology techniques in planning studies of individual/inter-individual phenotypic variation using the tools of genetics, transcriptomics and proteomics.		P8S_UW	

	4. Is able to make inferences based on the results of scientific studies whose methodology is based on molecular biology techniques.	P8S_UW
	5. Can plan scientific research and select appropriate methods and research techniques	P8S_UW
	6. Is able to select and prepare material for research and conduct measurements using modern research techniques	P8S_UW
	7. Is able to make conclusions based on the results of scientific research	P8S_UW
<b>social competencies</b>	1. Is ready to conduct scientific activities using modern research methods and techniques	P8S_KR
	2. Is ready to critically evaluate its own contribution to the development of the discipline of health sciences	P8S_KK

### **PROGRAM CONTENT**

*Course description, scope of the subject, issues and topics covered*

1. Definition and characteristics of the fields of physiotherapy and physioprophyllaxis- division and place in rehabilitation
2. Modern methods and techniques used in scientific research- practical examples based on EBM
3. The Action-Research paradigm in physiotherapy and physioprophyllaxis
4. Detailed research planning based on modern apparatus used in scientific research in physiotherapy and physioprophyllaxis
5. Exemplary analysis and inference of scientific research results based on modern research methods and techniques
6. Analyze the advantages and disadvantages of modern methods and techniques used for scientific research in physiotherapy and physioprophyllaxis.
7. translation of the conclusions of the results obtained to the practical ground - practical implications
8. Definition and characterization of the fields of medical biology: genetics and genomics, transcriptomics, proteomics, epigenetics
9. Planning of medical biology research:
  - consumable materials and apparatus,
  - guidelines for storage and preservation of biological material,
  - selection and size of groups,
  - selection of markers,
  - additional phenotypic/clinical evaluation of subjects,
  - cost of analyses.
10. Basic medical biology analyses:
  - DNA: analysis steps, DNA isolation, PCR reaction, PCR-RLFP, electrophoresis, genotyping with TaqMan probes, sequencing, MLPA, statistical analysis and inference,
  - RNA: RT-qPCR, microarrays,
  - proteins: ELISA, Luminex, isoelectric focusing.
11. The importance of modern research methods and techniques in scientific work;
12. The important role of proper selection of analytical methods and techniques at the stage of research planning;
13. Review of selected methods and techniques for collection of test samples, methods of preparing material for chemical analysis, and instrumental methods and techniques used in the discipline of health sciences - demonstration of measurements made using some modern research methods.

### **LEARNING OUTCOMES VERIFICATION**

<b>Method of verification of learning outcomes</b>	Development and presentation of a research project, incorporating in the methodology of physiotherapy and physioprophyllaxis techniques Development and presentation of a research project, containing in the methodology of molecular biology techniques. Presentation, Report,
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<b><i>Form and conditions of completion</i></b>	<p>Credit for a research project, containing in the methodology modern methods and techniques in the field of physiotherapy and physioprophyllaxis</p> <p>Credit for a research project, containing in the methodology of molecular biology techniques.</p> <p>100% attendance in class.</p>
<b><i>References</i></b>	
<b><i>Primary literature</i></b>	<ol style="list-style-type: none"> <li>1. Grygorowicz M, Podhorecka M. Kompendium fizjoprofilaktyki. Wyd. Uniwersytet Medyczny w Poznaniu, 2020</li> <li>2. Śliwiński Z, Sieroń A. Wielka Fizjoterapia. Tom 1,2,3. Wrocław: Wyd. Elsevier Urban &amp;Partner, 2014</li> <li>3. Biologia molekularna w medycynie. Pod red. J. Bala, Wydawnictwo Naukowe PWN.</li> <li>4. Techniki laboratoryjne w biologii molekularnej. Lewandowska Ronnegren A., Wydawnictwo Wrocław 2018.</li> </ol>
<b><i>Complementary literature</i></b>	<ol style="list-style-type: none"> <li>1. Maciąg-Tymecka I. Rehabilitacja w chorobach dzieci i młodzieży, diagnostyka funkcjonalna, programowanie rehabilitacji, metody leczenia fizjoterapeutycznego. PZWL, Warszawa, 2016</li> <li>2. Olszewski J. Fizjoterapia w wybranych dziedzinach medycyny. PZWL, 2011</li> <li>3. Krótkie wykłady Biologia molekularna, Turner P.C., McLennan A.G., Bates A.D., White M.R.H., Wydawnictwo Naukowe PWN.</li> <li>4. Analiza dna. Teoria i praktyka. Pod. red. R. Słomskiego, Uniwersytet Przyrodniczy w Poznaniu</li> </ol>