SYLLABUS – DOCTORAL SCHOOL
CYCLE OF EDUCATION 2022-2026

BASIC INFORMATION CONCERNING THIS SUBJECT	
Subject title	**Doctoral workshop**
Name of the unit realizing the subject	**Doctoral School in University of Rzeszów**
Subject type (compulsory, optional)	Monodiscipline (subject to choose from)
Year/Semester	I-IV, sem. I-VIII
Discipline	Science of Physical Culture
Language of lecture	polish
Name and surname of the course coordinator	Krzysztof Przednowek, PhD, DSc, Associate Prof.
Name and surname of the course instructor	Krzysztof Przednowek, PhD, DSc, Associate Prof.
Prerequisites	Basic knowledge, skills and competences in physical culture sciences passed on first- and second-degree studies. Detailed knowledge of the research methodology used in the sciences of physical culture.

ABSTRACT OF THE SUBJECT
(synthetic description of the content and objectives of the subject; 100-200 words)

Doctoral workshop is a subject during the implementation of which the research workshop of doctoral students is improved. As part of the course, modern technologies for diagnosing motor and psychomotor skills as well as assessing body structure and composition will be presented. While working in laboratories, PhD students will become familiar with research protocols and the practical side of conducting research in physical culture sciences. In particular, the methods of motion analysis with the use of motion capture systems, platforms for measuring ground reaction forces, dynamometric systems and surface electromyography will be presented and mastered. In addition, as part of the course, doctoral students familiarize themselves with computer software supporting the scientist's research workshop.

METHODS OF VERIFICATION OF LEARNING OUTCOMES

Symbol of effect	Expected learning outcomes efekty	Reference to learning outcomes for qualifications at PRK level 8 (symbol) (symbol)	Form of didactic classes	Verification methods (e.g., colloquium, oral exam, written exam, project, etc.)
Knowledge No.	**Knows and understands**			
1	To the extent that allows the revision of existing paradigms - world achievements, including theoretical foundations as well as general issues and selected specific issues - appropriate for the scientific or artistic discipline.	P8S_WG1	Seminar	project
2	Directions of development and the latest discoveries in the selected scientific discipline, current scientific achievements, including global, in the field of research in the area of the discipline.	P8S_WG2	Seminar	project

3	The conceptual framework of the discipline (also in a foreign language for it leading) and related disciplines.	P8S_WG3	Seminar	project
4	Research methodology, including the principles of research planning and implementation using interdisciplinary research techniques and tools.	P8S_WG4	Seminar	project
Skills No.	**Is able to**			
1	Use knowledge from various fields of science or art to creatively identify and innovatively solve complex problems or perform research tasks, in particular: define the purpose and subject of scientific research, formulate a research hypothesis, develop research methods, techniques and tools and apply them creatively, draw conclusions based on scientific research.	P8S_UW1	Seminar	project
2	Use the scientific literature to identify and solve research problems and related to innovative activities, and also uses the right workshop to create new elements this achievement.	P8S_UW2	Seminar	project
3	Critically analyze and evaluate the results of scientific research, expert activities and other works of a creative nature and their contribution to the development of knowledge	P8S_UW3	Seminar	project
Social competence No.	**Is ready to**			
1	Critical evaluation of achievements this scientific or artistic discipline.	P8S_KK1	Seminar	project

FORMS OF TEACHING CLASSES, HOURS AND CREDITS1

Semester (No.)	Lecture	Exercise	Laboratory	Practical	Other	**Number of point ECTS**
I	-	-	-	-	Seminar	4
II	-	-	-	-	Seminar	4
III	-	-	-	-	Seminar	4
IV	-	-	-	-	Seminar	4
V	-	-	-	-	Seminar	4
VI	-	-	-	-	Seminar	4
VII	-	-	-	-	Seminar	4

VIII	-	-	-	-	Seminar	4

TEACHING METHODS

1. Analysis and interpretation of scientific sources with discussion.
2. Multimedia presentations.
3. Participation in laboratory tests.
4. Statistical processing of research results.
5. Creating and discussing research reports

PROGRAM CONTENT

1. Introduction to research methods used in physical culture sciences.
2. Advanced and basic research protocols in the evaluation of motion technique using inertial and optical motion capture systems.
3. Advanced and basic research protocols using ground reaction force platforms.
4. The use of surface electromyography and tensomiography in the sciences of physical culture.
5. The use of systems for assessing cognitive abilities in the sciences of physical culture.
6. The use of ergospirometric systems in endurance tests.
7. The use of GPS sensors in the evaluation of training units in team sports games.
8. The use of accelerometer systems in the assessment of physical activity.
9. The use of dynamometric systems in the assessment of strength abilities.
10. Methods of assessing body structure and composition using bioimpedance and plethysmography.
11. Creation and interpretation of measurement protocols for multi-module biomechanical evaluation systems.
12. Data preparation and processing techniques, including database building, statistical analysis and introduction to machine learning algorithms.
13. Computer modeling in the sciences of physical culture, including the issue of sports prediction.
14. Familiarization with computer systems supporting the researcher's workshop (including JabRef, Statistica, R environment and Latex language).

CONDITIONS FOR COMPLETING THE SUBJECT (EVALUATION CRITERIA)

After each semester, PhD students submit a project. The grade is based on the sum of points obtained from the project:

- 51–60% max. points – dst (3,0)
- 61–70% max. points – dst plus (3,5)
- 71–80% max. points – db (4,0)
- 81–90% max. points – db plus(4,5)
- 91–100% max. points – bdb (5,0)

TOTAL STUDENT WORKLOAD REQUIRED TO ACHIVE THE DESIRED RESULT IN HOURS AND ECTS CREDITS

Activity	The average number of hours to complete the activity
Hours carried out in direct contact resulting from the study plan	240
Others with the participation of the teacher (participation in consultations, exam)	50
Hours carried out independently by the PhD student (preparation for classes, exam, writing a paper, etc.)	190
TOTAL HOURS	600
TOTAL NUMBER OF ECTS CREDITS	24

LITERATURE	
Primary literature:	1. Kusy K., Zieliński J.: Diagnostyka w sporcie, podręcznik nowoczesnego trenera. Wydawnictwo AWF Poznań, 2018. 2. Sozański H., Sadowski J., Czerwiński J.: Podstawy teorii i technologii treningu sportowego tom 1 i 2. Wydawnictwo AWF Warszawa, 2015. 3. Berbeka J., Lipecki K.: Aktywność fizyczna z wykorzystaniem technologii informacyjno-komunikacyjnych. Difin, 2019. 4. Anguera, M. T., & Hernández Mendo, A. 2013. Observational methodology in sport sciences. 5. Ryguła I. 2003, Proces badawczy w naukach o sporcie. AWF Katowice, Katowice.
Supplementary literature:	1. Baerg, A. (2022). Quantification, Big Data, and Biometrics in Sport. In *Sport, Social Media, and Digital Technology*. Emerald Publishing Limited. 2. Clark, J., & Nash, C. (2021). Big data in sport. In *Practical Sports Coaching* (pp. 201-211). Routledge. 3. Baca, A. (Ed.). (2014). *Computer science in sport: research and practice*. Routledge. 4. Ortega, B. P., & Olmedo, J. M. J. (2017). Application of motion capture technology for sport performance analysis. *Retos: nuevas tendencias en educación física, deporte y recreación*, (32), 241-247. 5. Fuss, F. K., Subic, A., & Mehta, R. (2008). The impact of technology on sport—new frontiers. *Sports Technology*, *1*(1), 1-2. 6. Omoregie, P. O. (2016). The Impact of technology on sport performance. In *Proceedings of INCEDI 2016 Conference*. 7. Beckham, G., Suchomel, T., & Mizuguchi, S. (2014). Force plate use in performance monitoring and sport science testing. *New Studies in Athletics*, *29*(3), 25-37. 8. Camomilla, V., Bergamini, E., Fantozzi, S., & Vannozzi, G. (2018). Trends supporting the in-field use of wearable inertial sensors for sport performance evaluation: A systematic review. *Sensors*, *18*(3), 873. 9. Taborri, J., Keogh, J., Kos, A., Santuz, A., Umek, A., Urbanczyk, C., ... & Rossi, S. (2020). Sport biomechanics applications using inertial, force, and EMG sensors: A literature overview. *Applied bionics and biomechanics*, *2020*. 10. Krzeszowski, T., Przednowek, K., Wiktorowicz, K., & Iskra, J. (2016). Estimation of hurdle clearance parameters using a monocular human motion tracking method. *Computer Methods in Biomechanics and Biomedical Engineering*, *19*(12), 1319-1329. 11. Scott, M. T., Scott, T. J., & Kelly, V. G. (2016). The validity and reliability of global positioning systems in team sport: a brief review. *The Journal of Strength & Conditioning Research*, *30*(5), 1470-1490.