załącznik nr 2 do uchwały Rady Szkoły Doktorskiej UPP nr 1/P/2023

SYLLABUS – PULS Doctoral School

Name of the course (as specified in the approved program): **Experimental methods in zootechnics and fisheries part 2 - Molecular genetics; biochemistry**	
Name of the course in Polish: **Metody eksperymentalne w zootechnice i rybactwie, część 2 – Genetyka Molekularna i Biochemia.**	
Unit providing the course (Department): **Department of Genetics and Animal Breeding and Department of Animal Biochemistry, Physiology and Biostructure**	
Course leader: **dr hab. Zofia E. Madeja** Tutors**:** **dr Tatiana Wojciechowicz and dr hab., Prof. UPP Marek Skrzypski**	
Discipline: **Animal science and fisheries**	Semester: **V**

TYPE OF CLASSES:
(course load)

- Lectures	**4**
- Practical classes	**7**
- Self-study	**1**
Total number of hours:	**12**

OBJECTIVE OF THE COURSE:

To understand the basic methods of quantitative and qualitative analysis in molecular biology and biochemistry:

Part 1: Molecular Biology methods – DNA (cDNA) analysis: introduction to quantitative real-time PCR (Q-PCR) technique;
Part 2: Biochemical methods of protein analysis: quantitative measurement of proteins (molecular analysis), protein extraction, quality and quantity evaluation (Western Blot).

TEACHING METHODS:

Multimedia presentations, laboratory work related to cDNA/DNA preparation for Q-PCR, primer design, product validation, quantitative analysis (methods of data calculation), laboratory work dedicated to the applications of protein analysis (Western Blot technique).

EDUCATION OUTCOMES*	Reference to education outcomes of the PULS Doctoral School
In the area of knowledge (PhD students know and understand): 1. how to find relevant literature 2. how to design an experiment related to quantitative DNA/cDNA and protein analysis that would allow to create original research concepts and implement interpretation of scientific data. 3. how to critically analyse the data	P8U_W_1 P8U_W_2
In the area of skills (PhD students know how to): 4. apply knowledge in the process of creative formulation of the research problem, that include preparing of biological specimens for molecular biology and biochemical studies 5. apply different staining methods depending on the biological material 6. being able to plan an experiment (solving research tasks)	P8U_U_1 P8U_U_2 P8U_U_4
In the area of social competencies (PhD students are capable to): 7. proper data interpretation, including critical thinking 8. independent planning of research and broadening the existing knowledge (that includes reading scientific literature) 9. creative solving of challenges in professional and public life, considering their ethical aspect	P8U_K_1 P8U_K_2

* efekty uczenia się stanowią Załącznik nr 1 do Regulaminu Szkoły Doktorskiej Uniwersytetu Przyrodniczego w Poznaniu, który stanowi załącznik do uchwały nr 44/2021 Senatu UPP

Methods of evaluation of outcomes achievement:

Evaluation will be based on student's knowledge after completing the course, this will be done on the basis of student's activity
during classes, short project related to data interpretation and on the exam – effects no: 1-9

TEACHING CONTENT:

Lecture 1: Biochemistry and detection of proteins: basic summary of protein structure, preparing proteins samples using various laboratory techniques, quantitative measurement of proteins, quality and quantity evaluation of proteins using Western Blot method.

Lecture 2: Molecular biology: principles of qualitative and quantitative PCR reactions (reagents, reaction conditions, reaction dynamics), reaction template preparation (DNA/cDNA), Q-PCR detection methods (SYBR vs molecular probes) data interpretation and troubleshooting, applications in science and diagnostics.

Practical classes 1: laboratory work: protein concentration measurement, Western Blot analysis (PAGE electrophoresis and semi- dry transfer of proteins onto the membrane, chemiluminescent detection of target protein using antibody-based detection assay.

Practical classes 2: laboratory work, preparing Q-PCR reaction, running the experiment, data analysis and interpretation.

The course completion criteria and methods:	Percent of a final grade:
Activities during class	10%
Project related to data analysis	30%
Exam	60%

Criteria:

- Test efficiency more than 60%
- Attendance at least 80%
- Active participation in the class (participation in the discussion, asking questions)

☐ pass (Z) **☐ course credit with a grade** **☒ examination**

RECOMMENDED LITERATURE:

1. Genetyka ogólna i weterynaryjna, pod redakcją naukową Prof. Marka Świtońskiego, wydawnictwo PWN, 2023r.ISBN: 987-83-01-23167-5.
2. Analiza DNA. Teoria i praktyka, pod redakcją Prof. Ryszarda Słomskiego, 2011 rok, Wydawnictwo Uniwersytetu Przyrodniczego w Poznaniu, ISBN: 978-83-7160-607-6.
3. Real-Time PCR, by M. Tevfik Dorak, ISBN-13: 9780415377348.
4. The MIQE guidelines: minimum information for publication of quantitative real-time PCR experiments. Bustin SA, Benes V, Garson JA, Hellemans J, Huggett J, Kubista M, Mueller R, Nolan T, Pfaffl MW, Shipley GL, Vandesompele J, Wittwer CT. Clin Chem. 2009;55(4):611-22. doi: 10.1373/clinchem.2008.112797.
5. Biochemia, Lubert Stryer, Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto, Wydawnictwo Naukowe PWN or the English version of this book: Biochemistry
6. Western Blot: Technique, Theory, and Trouble Shooting, Tahrin Mahmood and Ping-Chang Yang N Am J Med Sci. 2012 Sep; 4(9): 429–434. doi: 10.4103/1947-2714.100998
7. Pubmed and Google Schoolar.