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 3. Histology; Microbiology**	
Name of the course in Polish: **Metody eksperymentalne w zootechnice i rybactwie. Cześć 3: histologia; mikrobiologia**	
Unit providing the course (Department): **Laboratory of Histology and Embryology in Dept of Physiology, Biochemistry and Biostructure of Animals**	
Course leader: **dr hab. Kinga Skieresz-Szewczyk**	
Discipline: **Animal science and fisheries**	Semester: **6**

TYPE OF CLASSES:
(course load)

- Lectures	**5**
- Practical classes	**7**
- Self-study	**10**
Total number of hours:	**22**

OBJECTIVE OF THE COURSE:

The course introduces principles for modern methods of light (LM) and scanning (SEM)- and transmission (TEM) electron microscopy with practical preparation of biological and non-biological samples for 2D and 3D visualization and interpretation.

The practical course includes sampling biological materials from nonruminant animals, applying commonly used in-field microbiological methods, and evaluating obtained results with an emphasis on the characterization of gastrointestinal tract microbiota of monogastric livestock.

TEACHING METHODS:

Lectures- multimedia presentation
Practical exercises in LM, SEM lab, and computer lab with “Virtual microscopy” e-learning -platform
And in the microbiological laboratory.

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 literature sources related to microscopic imaging, and 2D and 3D imaging, and gastrointestinal tract microbiota of various animal species. 2. understand the principles of modern microscopy – including the method of LM SEM, TEM electron microscopy (TEM and SEM), as well as in-field microbiological methods (classical microbiology and McMaster method) to know the quality and sort of gathered information 3. the latest trends in microscopic visualisation allowed the creation of original research concepts and	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, which include preparing of biological specimens for microscopic observations 5. apply staining methods depending on the biological material or preparing microbiological samples depending on the gut segment - being able to plan an experiment (solving research tasks)	P8U_U_1 P8U_U_2 P8U_U_4

* 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

In the area of social competencies (PhD students are capable to): 6. proper data interpretation, including critical thinking 7. independent planning of research and broadening the existing knowledge (that includes reading scientific literature) 8. creative solving of challenges in professional and public life, considering their ethical aspect	P8U_K_1 P8U_K_2

Methods of evaluation of outcomes achievement:

Written test (theoretical knowledge): effect no 2,3,5,6
Evaluation of practical preparation of microscopical samples (practical knowledge) : effect no 1,4. 6,7, 8
Evaluation of practical preparation of microbiological samples (practical knowledge): effect no 1-8

TEACHING CONTENT:

Histology:

- the introduction to the preparation of biological and non-biological samples for analyses in light microscopy with special emphasis on histochemistry, immunohistochemistry, and autoradiography.
- The application of scanning and transmission electron microscopy and microtomography methods for 2D and 3D imaging of microscopic structures of animal and plant samples

Microbiology:

- Collection of biological material from non-ruminant animals for microbiological analysis
- Commonly used field methods applied in microbial analysis

The course completion criteria and methods:	Percent of a final grade:
Exam Activity during practical classes	50% 50%
Criteria: • 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. Goldstein, J. I., Newbury, D. E., Michael, J. R., Ritchie, N - . W., Scott, J. H. J., & Joy, D. C. Scanning electron microscopy and X-ray microanalysis. Springer, 2017.
2. Hayat, M.A. Eric. Basic techniques for transmission electron microscopy. Elsevier, 2012.
3. Haug, A., Williams, R. B., & Larsen, S. (2006). Counting coccidial oocysts in chicken faeces: a comparative study of a standard McMaster technique and a new rapid method. Veterinary parasitology, 136(3-4), 233- 242.
4. Kogut, M. H. (2022). Role of diet-microbiota interactions in precision nutrition of the chicken: facts, gaps, and new concepts. Poultry Science, 101(3), 101673.