SYLLABUS

General information about the course

Course title

Biochemistry and physiology of organisms.

Unit name

Institute of Plant Physiology Polish Academy of Sciences, National Research Institute of Animal Production.

Form of study

Full-time.

Type of course, number of hours

Lectures, 15 hours per semester.

Course type

Compulsory classes.

Year and semester

Summer semester 2025/2026.

Coordinator

Dr. hab. Marta Libik-Konieczny (IPP PAS), dr. hab. Anna Arczewska-Włosek (NRIAP).

Teaching person

Dr. Agnieszka Ostrowska (IPP PAS), according to the schedule of classes (NRIAP).

Aim of the course

Familiarization with:

1. The physiological processes and metabolic pathways that regulate plant function, including the biochemical foundations of these regulatory mechanisms;
2. The animal physiology, with particular emphasis on livestock species, including the physiological mechanisms underlying key life processes (such as nutrition, reproduction, stress response, and developmental regulation) in the context of animal biology and production.

Prerequisites/Requirements

Knowledge in biology at the 2nd level of the studies.

Learning outcomes

Knowledge

The doctoral student will have knowledge of the functioning of living organisms, with particular emphasis on the biochemical basis and regulatory mechanisms underlying physiological processes. The student will understand the roles that specific metabolic pathways play in the proper functioning and development of both plant and animal organisms.

Skills

The doctoral student will be able to analyse and evaluate the impact of environmental conditions on fundamental physiological processes and the functioning of living organisms. The student will be able to describe the relationship between growth and development conditions, cellular metabolism, and the overall physiological status of both plant and animal organisms. The student will be capable of formulating precise questions and deepening their knowledge in the fields of biochemistry and physiology.

Social competences

The doctoral student will be aware of the risks associated with excessive exploitation of the natural resources, environmental pollution, and global climate change, as well as their impact on the functioning of living organisms.

The student will be able to critically assess scientific data and information available in the mass media and will actively participate in discussions.

Program content

Course content includes:

1. Biochemical foundations of plant organism functioning.
2. Water and mineral management in plants.
3. Photosynthesis and respiration.
4. Plant growth and development.
5. Physiology and animal reproduction and development.
6. Physiology and animal nutrition.
7. Selected topics in the physiology of aquatic and invertebrate organisms.
8. Animal welfare and its impact on the functioning of livestock.

Teaching methods

Lecture with multimedia presentation, including a demonstration of selected measurement equipment (IPP PAS).

Evaluation

The course is completed based on participation in lectures and achieving a positive grade on the final test exam.

Methods and criteria of assessment

Attendance at lectures confirmed by signing the attendance list. If lectures switch to online format due to sanitary restrictions, attendance will be confirmed via MS Teams. Final credit is based on the material presented during lectures, in accordance with the attached rules.

Workload required to achieve learning outcomes

Participation in lectures – 15 hours.
Participation in the exam – 10 hours.
1 ECTS.

Language

English.

Literature

Basic literature:

1. Kopcewicz J., Lewak S. (red.) 2012. Fizjologia roślin. Wydawnictwo Naukowe PWN, Warszawa.
2. Kopcewicz J. 2012. Podstawy biologii roślin. Wydawnictwo Naukowe PWN, Warszawa.
3. Lincoln Taiz, Eduardo Zeiger, Ian Max Møller, Angus Murphy Plant Physiology and Development. 2015.7th edition, Sinauer Associates (wydawnictwo Oxford University Press)–
4. Krzymowski T., Przała J. (red.) 2005. Fizjologia zwierząt. PWRiL, Warszawa
5. Frandson, R. D., Wilke, W. L., Fails, A. D. (2009). Anatomy and physiology of farm animals (7th ed.). Wiley-Blackwell.
6. Nagy, Z. P., Varghese, A. C., Agarwal, A. (2024). Cryopreservation in assisted reproduction: A practitioner's guide to methods, management and organization. Springer Nature. doi:10.1007/978-3-031-58214-1
7. Geisert, R. D., Sutovsky, P., Lucy, M. C., Bartol, F. F., Meyer, A. E. (2020). Chapter 15: Reproductive physiology of swine. In F. W. Bazer, G. C. Lamb, G. Wu (Eds.), Animal Agriculture (pp. 263–281). Academic Press. doi:10.1016/B978-0-12-817052-6.00015-X

8. Tang, C., Hu, W. (2024). Epigenetic modifications during embryonic development: Gene reprogramming and regulatory networks. Journal of Reproductive Immunology, 165, 104311. doi:10.1016/j.jri.2024.104311
9. Van Soest, P. J. (1994). Nutritional ecology of the ruminant. Cornell University Press.
10. Dymek, A. M., Pol, P., Protasewicz, D., Dymek, J., Kujawa, R. (2023). Badania i hodowla koralowców: Wybrane zagadnienia. Monografia. Instytut Zootechniki – Państwowy Instytut Badawczy.
11. Collier, R. J., Renquist, B. J., Xiao, Y. (2017). A 100-year review: Stress physiology including heat stress. Journal of Dairy Science, 100(12), 10367–10380. doi:10.3168/jds.2017-13676
12. Additional publications recommended by lecturers.

Signatures

Signature of the coordinator .....

Signature of the Head of Doctoral School .....

Passing rules/Exam rules

1. The exam is conducted and graded by the course coordinator.
2. The examination is administered in the form of a single choice test.
3. The examination consists of closed, single-choice questions, scored according to the principle of awarding 1 point for each correct answer to a single-choice question.
4. The exam grade is based on the total points obtained in the written test and is determined according to the following rules:

Percentage share of points (%) achievable	Grade oral	Grade figure
91 – 100	Very good (bdb)	5,0
81 – 90	Good plus (p.db)	4,5
71 – 80	Good (db)	4,0
61 – 70	Satisfactory good (p.dst)	3,5
55 – 60	Satisfactory (dst)	3,0
0 – 54	Fail (ndst)	2,0

5. An unexcused absence from the exam results in receiving a grade of "2.0" (Fail).
6. The exam is passed if 55% of the total points possible is obtained.
7. Positive exam grades cannot be improved to a higher grade.
8. If a doctoral student receives an unsatisfactory grade in an examination, he or she is entitled to only one resit examination during the academic year (see Regulations for doctoral studies).
9. The resit exam shall be conducted in accordance with these rules.
10. The grade is entered into the student's index book by the person conducting the exam.