SYLLABUS

Name of the course (as specified in the approved curriculum) **Module 8 – Animal Breeding Programs**			Number of ECTS credits 7
Name of the course in Polish **Planowanie i Organizacja Pracy Hodowlanej**			
Unit providing the course **Department of Animal Genetics and Breeding**			
Course co-ordinator **dr hab. Marcin Pszczola**			
Field of study Animal Production Management	Level II – master studies	Profile Academic-general	Semester **3**

TYPE OF CLASSES AND COURSE LOAD
(Classes with teacher and student's own work)

Mode of studies: full-time		Mode of studies: part-time	-
- lectures	25	- lectures	-
- practical classes	40	- practical classes	-
- field classes	0	- field classes	-
- labs	0	- labs	-
- consultations	5	- consultations	-
- own student's work	75	- own student's work	-
- others	30	- others	-
Total number of hours	175	Total number of hours	-

OBJECTIVE OF THE COURSE

Introduction to design and optimization of animal breeding programs based on traditional and alternative strategies. Presentation of the consequences of long-term selection. Presentation of methods of utilizing genetic markers in animal breeding. Introduction to methods for estimating genomic and conventional breeding values; assessing breeding values accuracy. Presentation of novel traits examples and introduction to new possibilities for improving such traits utilizing genomic selection. Analysis of breeding programs for selected livestock species.

TEACHING METHODS

Lectures – presentation with the use of multimedia projectors.
Labs – computer lab, exercises using simulation software, case studies using worksheet prepared examples, preparing and presenting a phased project verified by the teacher: selected elements of breeding programs in animal breeding.

	Course learning outcomes	The reference to the study field learning outcomes
Knowledge	O1: Student knows the advanced aspects of statistics, planning, and executing animal breeding programs; knows the factors affecting breeding progress, as well as the practical application of animal husbandry knowledge. O2: Student knows the advanced methodology used in animal breeding. O3: Student knows the rules of experimental data analysis, hypothesis testing, and experimental designs. O4: The student knows selected aspects of quantitative trait genetics. O5: Student knows methods of animal improvement, including genomic selection, the usefulness of phenotypic, pedigree, and molecular data in livestock breeding; the consequences of animal selection, including alternative strategies of genetic improvement concerning socio-economic circumstances.	AP2A_W01 AP2A_W02 AP2A_W03 AP2A_W04 AP2A_W05

Skills	O6: Student can search, critically analyze, and interpret information from literature, databases, and other sources related to animal science, present this knowledge, and communicate with various stakeholders in oral, written, and graphical form. O7: Student can fluently use scientific literature in selected areas of animal science and discuss these topics with specialists from various fields using foreign congress language according to requirements set out for B2+ level of the Common European Framework of Reference for Languages, with particular reference to vocabulary in the field of animal science. O8: Student can plan and perform scientific experiments, carry out research and implementation projects in the field of zootechnics; elaborate and statistically analyze experiments, as well as assess the significance of the examined factors. O9: Student can apply modern techniques and technologies in animal husbandry and breeding. O10: Student can design simple experiments on farm animals, analyze experimental data, and perform basic statistical inference.	AP2A_U01 AP2A_U02 AP2A_U03 AP2A_U05 AP2A_U12
Social competences	O11: The graduate understands the need for lifelong learning and updating the cognitive skills, as well as to inspire and organize the learning process of other people; to demonstrate a creative attitude; to think and act in an entrepreneurial way. O12: The graduate is prepared to take the ethical and social responsibility for the effects of the activities in the field of animal production with particular reference to domestic animals. O13: The graduate can assess the risk of the business impact, personal threats, and the safety of colleagues and the environment.	AP2A_K01 AP2A_K03 AP2A_K04

Methods for verifying learning outcomes	Symbols of course learning outcomes
Two writing tests.	O1-O10
Presentation of the breeding program based on the real operating example and its evaluation.	O1-O13

TEACHING CONTENTS

Lectures:

Breeding goal definition and breeding strategy selection. Elements of animal breeding programs and methods of their optimization. Traditional and alternative programs of animal improvement, exploring nonadditive genetic variance. Reproduction techniques and their role in animal breeding. Genetic factors contributing to the performance of crossbred animals. Economic aspects of animal breeding. Marker-assisted selection. Principles of genomic selection. Relationships (pedigree vs. genomic). Estimating genomic breeding values. Accuracy of breeding values. Phenotypes in genomic selection. Novel traits. Genotype imputation. Improving the accuracy of novel traits. Research tools used for breeding – e.g., SNP microarrays

Labs:

Factors determining animal breeding strategies. Elements of animal breeding programs. Practical use of the method to optimize breeding programs. Prediction of the rate of genetic improvement of alternative breeding programs. Introduction to breeding programs that exploit non-additive genetic variation. Relationships (pedigree vs. genomic). Estimating genomic breeding values. Accuracy of breeding values. Genetic progress due to genomic selection.

Forms and criteria for completing the course	Percentage of a final grade
1. Genomic selection (Test)	1. 45%
2. Breeding programs	2. 55%
(Test # 1 – Weight 1/3, Test #2 1/3, Breeding program phased project – weight 1/3)	

Literature list

Core literature

1. Sanders S. 2022. Understanding Animal Breeding and Genetics/
2. Douglas S. Falconer and Trudy F.C. 1996. Introduction to Quantitative Genetics
3. Kinghorn. B.P. Van der Werf. J. and Ryan. M. 2000. Animal Breeding - Use of New Technologies.

Additional sources

1. Popular-scientific articles

Scientific articles (for example: Journal of Dairy Science, Journal of Animal Science, Journal of Applied Genetics)