SYLLABUS (OF A COURSE/MODULE)

Course/module (as specified in the approved curriculum for the field of study) **Module-3 Animal improvement methods**			ECTS **11**	Catalogue number
Name in Polish **Metody doskonalenia zwierząt**				
Unit(-s) providing the course/module (Institute/Department) **Department of Genetics and Animal Breeding** (Katedra Genetyki I Podstaw Hodowli Zwierząt)				
Head of course/module **Prof. Maciej Szydłowski**				
Field of study **Animal husbandry**		**Level** **2nd level studies**	**Profile** **General academic**	**Semester** **1**
Specialisation **Animal production management (Foreign students)**		MSc Specialisation **Animal production management (Foreign students)**		

TYPE OF CLASSES/LECTURES AND THE NUMBER OF HOURS
(organised classes/lectures and self-study)

Type of studies: full-time		Type of studies: extramural	
- lectures	30	- lectures	
- Labs	70	- classes	
- Other- tutored	55	-	
-		-	
-		-	
- Self-study	120	- Self-study	
Total number of hours:	275	Total number of hours:	

OBJECTIVE OF COURSE/MODULE

Introduction to animal improvements methods via optimization of environment, genetics of quantitative traits and genetic engineering. Introduction to objective/statistical evaluation of effects of experimental factors on animal traits including experimental design. Presentation on modern knowledge on inheritance and genetic background of polygenic traits and the methods used in quantitative genetics. Introduction to current molecular methods used in production and detection of genetically modified organisms.

TEACHING METHODS

Lectures – presentation with use of multimedia projectors
Labs – computer lab, molecular genetics lab

	LEARNING OUTCOMES	Reference to field outcomes	Reference to area outcomes
Knowledge	E1-has knowledge on analysis of experimental data, hypothesis testing and experimental design, E2-has knowledge on genetics of quantitative traits and methods used in quantitative genetics E3-has knowledge on methods used in genetic engineering and GMO	Z2A_W01 Z2A_W02 Z2A_W12 InzA_W01 InzA_W02 InzA_W05	R2A_W01 R2A_W04 R2A_W05
Skills	E4-can design simple experiments an farm animals, can analyse experimental data and make basic statistical inference E5-can describe the usefulness of phenotypic, pedigree and molecular data to improvements of animal population E6-can discuss possible new animal products and traits developed via genetic engineering	Z2A_U01 Z2A_U03 Z2A_U04 Z2A_U05 Z2A_U06 InzA_U01 InzA_U05 InzA_U06 InzA_U08	R2A_U01 R2A_U02 R2A_U03 R2A_U04 R2A_U05 R2A_U07
Social competences	E7-is aware of the importance of statistical methods in the objective assessment of the effects of environmental factors on animal traits E8-is aware of the importance of the cooperation with genetic centres to apply modern genetic improvement methods in animal breeding E9-is aware of potential of genetic engineering in animal improvement and product development	Z2A_K01 Z2A_K05 Z2A_K06 InzA_K01	R2A_K01 R2A_K04 R2A_K05

Methods to verify learning outcomes	Outcome Reference Numbers
Tests and presentations	E1-E6

TEACHING CONTENT

Lectures

Experimental design: Variables and probability distributions. Measures of central tendency and variability. Statistical hypothesis. Selected parametrical and nonparametrical tests. Power of some statistical tests and determining sample size. Statistical models and inference on their parameters. Matrix algebra. Analysis of variance and regression. Data transformations.

Genetics of quantitative traits: Properties of single locus and HW equilibrium. Breeding value of mono and poligenic traits. Coefficients of relationship and inbreeding. Heterosis and inbred depression. Partitioning of phenotypic variance, genetic parameters and methods of estimation. Selection and genetic progress.

Genetic engineering: Usefulness of genetically modified organisms in agriculture. Gene constructs – how are they arranged? Transfection of animal cells.

Other

Experimental design: R Environment. Data and management of data. Computations for descriptive statistics. Selected statistical tests. Determining sample size. Matrix algebra. Analysis of variance and regression.

Genetics of quantitative traits: Properties of single locus and HW equilibrium. Breeding value of mono and poligenetic traits. Coeficients of relationship and inbreeding. Heterosis and inbred depression. Partitioning of phenotypic variance, genetic parameters and methods of estimation. Selection and genetic progress.

Genetic engineering: Vectors and molecular cloning. Molecular detection of GMO. Cytogenetic characterization of GMO.

Forms and criteria for passing of course/module	
To complete the module each of the elements listed below have to be completed.	Weights for the final grade
Experimental design: test+presentation, min 50% of points	40%
Genetics of quantitative traits: test	40%
Genetic engineering: test, min 51% of points	20%

LIST OF LITERATURE

Literature

Core literature

1. Ott L. An introduction to statistical methods and data analysis. PWS Publishers, Boston
2. Douglas S. Falconer and Trudy F.C. 1996. Introduction to Quantitative Genetics

Additional sources

1. Popular-scientific articles

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