Module of classes:

INTRODUCTION TO GENETIC ENGINEERING

ECTS	**2**
Status	**obligatory**
Form of final credit	**Exam**
Requirements	**knowledge and skills in the field of cell biology, biochemistry and the basics of genetics**

Field of study:

Animal Science

Profile of study	**General-academic**
The code of the form of study and the level of study	**master of thesis**
Semester of study	**winter**
Language of study	**English**

The leading faculty, department and the lecturer of the module:

Name of the competent unit for the coordinator	**Faculty of Animal Sciences, Department of Animal Physiology and Endocrinology**
Course coordinator	**Prof. dr hab. Andrzej Sechman**

Learning outcomes of the module/subject

The code of the description component (symbol of the effect)	Description	Relation to (code)	
		field effect	discipline#
KNOWLEDGE – the student knows and/or understands:			
IGI_W1	the most important scientific discoveries that have contributed to the development of genetic engineering and describes the structure and function of nucleic acids and explains the cellular processes of DNA and RNA	ZOO2_W03	RZ
IGI_W2	enumerates and characterizes each group of enzymes used in the manipulation of DNA and RNA, explains the importance of restriction enzymes in the laboratory techniques	ZOO2_W03	RZ
IGI_W3	methods for DNA cloning in different types of vectors and explains application of DNA cloning techniques in genetic engineering	ZOO2_W03	RZ
IGI_W4	the different methods used in the analysis of DNA and RNA; explains ways of using known analytical methods in molecular experiments	ZOO2_W03	RZ
SKILLS – the student can:			
IGI_U1	use the knowledge of the structure and function of nucleic acids	ZOO2_U02	RZ
IGI_U2	explain the meaning of restriction enzymes and can use them in DNA cloning; can prepare the experiment, the purpose of which is to introduce the gene into a vector, followed by its amplification in E. coli	ZOO2_U02	RZ
IGI_U3	use and select the appropriate genetic engineering techniques for the analysis of nucleic acids	ZOO2_U02	RZ
IGI_U4	design an experiment using PCR techniques, RT-PCR, qPCR; interpret the results of the analysis of gene expression	ZOO2_U02	RZ
SOCIAL COMPETENCE- the student is ready to:			
IGI_K1	understand the need of continuous learning and training throughout whole life	ZOO2_K02	RZ
IGI_K2	understand a sense of responsibility, and the risks and consequences of genetic manipulation	ZOO2_K09	RZ
IGI_K3	recognize the importance of ethics in research in the field of genetic engineering	ZOO2_K08	RZ

Teaching content:

Lectures		**15**	**hours**
Subjects of lectures	Guide to basic concepts of genetic engineering. Structure of nucleic acids, and their physical and chemical properties. DNA and RNA modifying enzymes: DNA and RNA polymerases, nucleases, enzymes modifying the ends of DNA fragments, DNA ligase. Restriction enzymes, nomenclature, distribution and application in genetic engineering Vectors - application in molecular cloning and transgensis Methods of nucleic acid analysis: Southern blot, Northern blot and slot-blot PCR method - varieties and the application in laboratory work RT-PCR, Real-time PCR, miRNA – application in determination of gene expression		
Realized learning outcomes	IGI_W1-W4; IGI_U1-U4, IGI_K1-K3		
Verification methods and criteria of effects evaluation	Exam in the form of a test covering issues discussed during lectures; a positive grade should be given at least 55% of the correct answers to the questions asked.		

Classes (laboratories, field exercises, auditorium exercises etc. …)		**0**	**hours**
Subjects of the classes			
Realized learning outcomes	not aplicable		
Verification methods and criteria of effects evaluation	not aplicable		

Seminars		**0**	**hours**
Subjects of the seminars			
Realized learning outcomes	not aplicable		
Verification methods and criteria of effects evaluation	not aplicable		

Literature:

Basic	1. T.A. Brown, „Genmes", PWN, Warszawa, 2009. 2. "Molecular cloning: a laboratory manual (Sec. Ed.), J. Sambrook, E.F. Fritch i T. Maniatis, J. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, 1989. 3. "Recombinant DNA", James Watson i inn., Scientific American Books, New York, 1992.
Supplementary	1. „Genes V", Benjamin Lewin, Oxford University Press, Oxford New York Tokyo, 1994. 2. Sechman A. et al. Effects of 2,3,7,8-tetrachlorodibenzo-p-dioxin on secretion of steroids and STAR, HSD3B and CYP19A1 mRNA expression in chicken ovarian follicles. Toxicol. Lett. 225 (2), 264-274, 2014. 3. Sechman A. et al. Effects of PCB 126 and PCB 153 on secretion of steroid hormones and mRNA expression of steroidogenic genes (STAR, HSD3B, CYP19A1) and estrogen receptors (ERα, ERβ) in prehierarchical chicken ovarian follicles. Toxicol. Lett., 264, 29-37, 2016.

Structure of learning outcomes:

Discipline – animal husbandry and fishery (RZ)				2	ECTS*
Discipline –…				…	ECTS*
Structure of student's activities:					
classes carried out with direct participation of the teacher		25	hours	1	ECTS*
including:	lectures	15	hours		
	classes and seminars	0	hours		
	consultations	7	hours		

participation in research	0	hours		
mandatory practices and internships	0	hours		
participation in the exam and credits	3	hours		
classes carried out with the use of e-learning	0	hours	0	ECTS*
student's own work	25	hours	1	ECTS*

) * - Reported to the nearest to 0,1 ECTS, where 1 ECTS = 25-30 hours of classes

) # discipline code: RZ - zootechnics and fishery, PB - biological sciences