Course name:

INTRODUCTION TO GENETIC ENGINEERING

ECTS	**2**
Course status	**obligatory**
Course final assessement/evaluation of outcomes	**exam**
Prerequisites	**knowledge and skills in the field of cell biology, biochemistry and the basics of genetics**

Main field of study:

ANIMAL SCIENCE

Profile of study	**General-academic**
The code of studies (education level)	**SM (master)**
Semester of studies	**winter**
Language of instruction	**English**

Course offered by:

Name of faculty offering the course	**Faculty of Animal Sciences**
Name of department offering the course	**Department of Animal Physiology and Endocrinology**
Course coordinator	**Prof. dr hab.Andrzej Sechman**

Learning outcomes of the course:

Symbol of outcome	Description of learning outcome	Reference to	
		main field of study outcomes	discipline#
KNOWLEDGE – student knows and/or understands:			
IGI_W1	the most important scientific discoveries that have contributed to the development of genetic engineering; 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 – student is able to:			
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; prepare the experiment, the purpose of which is to insert the DNA fragment into a bacterial or yest vector, followed by its amplification in the choosen vector	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- 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 contents:

Lectures	**15 hours**
Topics of the 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 DNA clonning Vectors types and their application in DNA 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
Accomplished learning outcomes	*IGI_W1-W4; IGI_U1-U4, IGI_K1-K3*
Verification methods, rules and criteria of outcome assessment	*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	**0 hours**
Topics of the classes	
Accomplished learning outcomes	*not aplicable*
Verification methods, rules and criteria of outcome assessment	*not aplicable*

Seminars	**0 hours**
Topics of the seminars	
Accomplished learning outcomes	*not aplicable*
Verification methods, rules and criteria of outcome assessment	*not aplicable*

References:

Basic	*1. T.A. Brown, „Genomes", 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. - publications of the course coordinator*

Structure of learning outcomes:

Discipline: # *RZ*				2	ECTS**
Discipline: # (*provide appripriate symbol - if the course relates to more than one academic discipline*)				*0*	ECTS**
Structure of student activities:					
Contact hours		25	hours	1	ECTS**
including:	lectures	15	hours		
	classes and seminars	0	hours		
	consultations	7	hours		
	participation in research	0	hours		
	mandatory trainerships	0	hours		
	participation in examinations	3	hours		
e-learning		0	hours	0	ECTS**
student own work		25	hours	1	ECTS**

Syllabus valid from the academic year 2021/2022

*** where 10 hours of classes = 1 ECTC (in case of 15 h → 2 ECTS)**

** stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25 - 30 hours of classes

academic discipline code: RZ - animal science and fishery, PB - biological sciences, etc.