University of Gdańsk

Subject card

Subject name and code	Essentials of genetics and genetic engineering, PG_00054841		
Field of study	Environmental Protection		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	postgraduate studies	Subject group	Obligatory subject group in the field of study
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	academic	Assessment form	
Conducting unit	Faculty of Biology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Anna Wysocka	
	Teachers	dr hab. Anna Wysocka	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	5.0	15.0	50

Subject objectives

Deepening knowledge/ability to understand the rules of heredity and genetic variation. Providing knowledge about the functioning/cooperation of genes, understanding the genotype-phenotype relation. To indicate the importance of genetic diversity for the condition of populations/species. Knowledge of methods for analyzing genetic variation, determining the genetic structure of a population and factors influencing it. Presentation of research methods, developing the ability to ask questions, make assessments and solve uncomplicated genetic problems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[OŚMU2_U01] On the basis of the acquired knowledge, proposes to solve environmental problems.	is able to assess the vulnerability of a species to threat on the basis of available data; chooses the method of assessing the genetic diversity of a population or species; proposes how to manage natural populations	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written [SU5] implementation of a problem task [SU8] observation of student's independent or team work
[OŚMU2_W05] Describes development directions and the latest discoveries in the field of scientific disciplines related to environmental protection.	explains the genetic structure of populations (populations and gene pools, genotype and gene frequencies) and understands the processes of change in populations (Hardy-Weinberg rule, the influence of selected factors on the state of genetic balance); explains the importance of genetic diversity for the health of populations and species	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW5] implementation of a problem task
[OŚMU2_W01] Describes complex phenomena and processes occurring in nature, including those related to the spread of anthropogenic pollution.	explains the rules of inheritance, describes the mechanisms of the gene flow and the regulation of its expression and the sources of variability in organisms	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW5] implementation of a problem task

Subject contents	Classical genetics (dominance and recessivity, Mendel's rules, genotype, phenotype). Inheritance inconsistent with Mendel's rules. Basic properties of genes (e.g. gene penetrance, trait expressivity, pleiotropy, modification, genetic anticipation). Multiple alleles. Interaction of allelic and non-allelic genes. Lethal genes. Sex-linked, related and sex-restricted inheritance. Chromosomal basis of heredity (genes and chromosomes, recombination of conjugated genes). Gene mapping methods. Inheritance of quantitative traits. Multifactorial inheritance. Genomic imprinting. Genetic structure of populations (populations and gene pools, genotype and gene frequencies). Processes of change in populations (Hardy-Weinberg's rule, the influence of selected factors on the state of genetic equalibrum). The importance of genetic diversity for the health of populations and species. DNA structure and forms of DNA occurrence. DNA replication and regulation of this process. DNA recombination. DNA damage, mutations and DNA repair. Gene expression in prokaryotic and eukaryotic cells and regulation of this process. DNA manipulation as the basis of genetic engineering (enzymes used in genetic engineering, vectors, methods of introducing foreign DNA of cells, controlled expression of recombinant genes). Methods of nucleic acid analysis. Genomics and proteomics.
Prerequisites and co-requisites	
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
final test	51.0%	90.0%
activity in the class	0.0%	10.0%

Recommended reading	Basic literature	Allendorf F.W., Luikar G. Conservation and the Genetics of Populations, Blackwell Publishing, Oxford, UK, 2007 Brooker R. (ed.) Genetics: Analysis and Principles, 6-th edition. Mc Graw Hill. 2017 Charon K. M., Świtoński M. Genetics and genomics of animals. PWN Warsaw, 2019 Futuyma D.J. Evolution. WUW, Warsaw, 2008
	Supplementary literature	Charon K. M., Świtoński M. Animal genetics. PWN Warsaw, 2006Krebs J.E., Goldstein E.S.,. Kilpatrick S.T. Lewin's GENES XII . Jones & Bartlett Learning; 12th Edition. 2017Węgleński P.: Molecular genetics. PWN Warsaw, 2012.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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