University of Gdańsk

Subject card

Subject name and code	Animal population genetics, PG_00147840		
Field of study	Genetics and Experimental Biology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	undergraduate studies	Subject group	Obligatory subject group in the field of study Optional subject group
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish English
Semester of study	6	ECTS credits	2.0
Learning profile	academic	Assessment form	
Conducting unit	Pracownia Ewolucji Molekularnej i Bioinformatyki -> Katedra Genetyki Ewolucyjnej i Biosystematyki -> Faculty of Biology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Andre Viola De Moura	
	Teachers		

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	15.0	0.0	0.0	0.0	15
	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	15	12.0	23.0	50

Subject objectives

- Overview of theoretical population genetics and its applications to animal science.
- Understanding of factors causing changes in genetic composition of populations over time and space
- Case studies will illustrate how the theory and molecular techniques are applied to address questions in evolutionary biology, ecology and animal behaviour.
- Practical applications of population genetics will be discussed, with the particular emphasis identifying operational taxonomic units, distinct populations of wild animals, and breeding of domesticated animals.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[GBEL3_W05] the principles of research planning based on achievements in biological sciences and related fields, the potential application of their results in practice, the principles of operation of equipment and apparatus used in molecular genetics research, and the principle of interpreting biological phenomena and processes based on empirical data in research and practical activities, with consideration for sustainable use of biological diversity.	- Understands methods for quantifying genetic variation in animal populations - Understands applications of population genetics principles in animal science	[SW2] presentation/project/paper/ report
[GBEL3_W06] the development and current state of knowledge, as well as the latest trends in molecular genetics and related fields; indicating their relationship with other disciplines in the natural or medical sciences and the possibilities of their practical application.	- Understands theoretical population genetics and its applications to animal science. - Understands factors causing changes in genetic composition of populations over time and space, and how these changes constitute a link between molecular and ecological processes	[SW2] presentation/project/paper/ report
[GBEL3_K07] Lifelong learning and updating knowledge in the field of molecular genetics and other disciplines.	- Understands theoretical population genetics and its applications to animal science. - Understands applications of population genetics principles in animal science	[SK2] presentation/project/paper/ report
[GBEL3_U06] Prepare and deliver oral presentations in Polish and English on specific topics within the field of biology, as well as present ideas and results in written and oral form.	- Can prepare and deliver a presentation on how to use the principles and methods of population genetics, to address a scientific question or practical challenge in the field of animal science.	[SU2] presentation/project/paper/ report

Subject contents

1. Theoretical basis of population genetics
2. Types of molecular markers and their application in population genetics
3. Methods of assessing genetic diversity in individuals, populations and species
4. Identify population structure and estimate number of populations in wild populations
5. Phylogeographic approaches to infer evolutionary history of populations and species; identification of cross-lineage gene flow
6. Genetic mechanisms associated with small populations; inbreeding and its consequences; mechanisms maintaining genetic diversity in wild
populations
7. Introduction to genomic methods
8. Case studies based on a wide range of taxonomic groups

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
assignment work – project or presentation	50.0%	100.0%

Recommended reading

Basic literature

- Allendorf, F.W., and Luikart, G. (2011) Conservation and the Genetics of Populations. Blackwell Publishing. ISBN 1405121459
- Beebee, T., and Rowe, G. (2010) An Introduction to Molecular Ecology. 2nd Edition. OUP. ISBN 0199292051
- Freeland, J.R., Kirk, H. and Petersen, S.D. (2011) Molecular Ecology. 2nd Edition. Wiley-Blackwell. ISBN 0470748338
- Hamilton, M.B. (2009) Population Genetics. Wiley-Blackwell. ISBN 1405132779
- Hartl, D. (2000) A Primer of Population Genetics. 3rd Edition. Sinauer Associates. ISBN 0878933042
- Hartl, D. and Clark, A.G. (2007) Principles of Population Genetics. 4th Edition. Sinauer Associates. ISBN 0878933085Supplementary literature

	Supplementary literature	Moura AE, Shreves K, Pilot M, Andrews KR, Moore DM, Kishida T, Möller L, Natoli A, Gaspari S, McGowen M, Chen I, Gray H, Gore M, Culloch RM, Kiani MS, Sarrouf Willson M, Bulushi A, Collins T, Baldwin R, Willson A, Minton G, Ponnampalam L, Rus Hoelzel A (2020) Phylogenomics of the genus Tursiops and closely related Delphininae reveals extensive reticulation among lineages and provides inference about eco-evolutionary drivers. Mol Phylogenet Evol 146:106756. doi: 10.1016/j.ympev.2020.106756 Moura, A.E., Kenny, J.G., Chaudhuri, R., Hughes, M.A., Welch, A., Reisinger, R.R., de Bruyn, P.J.N., Dahlheim, M.E., Hall, N. & Rus Hoelzel, A. (2014). Population genomics of the killer whale indicates ecotype evolution in sympatry involving both selection and drift. Mol. Ecol. 23, 51795192. doi: 10.1111/mec.12929 Moura, A.E., Tsingarska, E., Dąbrowski, M.J., Czarnomska, S.D., Jędrzejewska, B. & Pilot, M. (2014). Unregulated hunting and genetic recovery from a severe population decline: the cautionary case of Bulgarian wolves. Conserv. Genet. 15, 405417. doi: 10.1007/s10592-013-0547-y
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Use population genetics to answer a biological question Example scenarios for the presentations: - Identify the level of inbreeding in a domestic breed of a farm/domestic animal - Identify the patterns of population structure in a wild animal group - Test if phenotypic traits are under selection in an animal group	
Work placement	Not applicable	

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