University of Gdańsk

Subject card

Subject name and code	Pathology and molecular diagnostics of aquatic organisms - lecture, PG_00192222						
Field of study	Marine Biotechnology						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2026/2027			
Education level	Master's 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	English			
Semester of study	1		ECTS credits	2.0			
Learning profile	academic		Assessment form	exam			
Conducting unit	Laboratory of Aquaculture -> Department of Marine Biology and Biotechnology -> Faculty of Oceanography and Geography -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Konrad Ocalewicz				
	Teachers						
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		1.0	19.0	50	
Subject objectives	The main goal is to obtain theoretical knowledge in the field of molecular diagnostics used in wild and farmed animals organism from the aquatic environment. Students will acquire theoretical knowledge of the organization of the genome of aquatic prokaryotic organisms eukaryotes, modern methods in the field of molecular diagnostics and examples of the application of these methods in aquatic organisms breeding. Moreover, during the classes, students will acquire knowledge about pathogens dangerous to fish and developmental disorders of tissues and organs somatic and reproductive.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[MBMU2-KK03] Is ready to apply the principles of occupational health and safety, especially in the laboratory and at sea; is responsible for their own and others' safety; can recognize hazards and take appropriate action	Is ready to assess and understand threats and dilemmas, including dilemmas ethical issues related to conducting scientific research in the field of diagnostics molecular and introducing advanced technologies; understands and appreciates the importance of intellectual property; acts ethically	[SK1] oral statement/conversation/ discussion [SK3] text preparation/written work
[MBMU2-KU03] Can use and critically analyze available scientific information; can prepare and present - orally or in writing - a paper covering detailed problems in the field of marine biotechnology on the basis of the scientific information or their own work, with the use of scientific language, including specialized terminology and conceptual apparatus; has the ability to conduct discussions	Is able to fluently use and critically analyze available information scientific; based on them and on the basis of his own work, he can prepare and present an oral presentation and/ or a written presentation including detailed information issues in the field of marine biotechnology, using scientific language, including specialized terminology and conceptual apparatus; has the ability to lead discussion	[SU8] observation of student's independent or team work
[MBMU2-KW04] Knows and deeply understands advanced research methods used in marine biotechnology and related sciences	Knows and understands complex biological phenomena at a high level molecular, understands their importance for aquatic organisms.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion

Subject contents

block 1 A1: Introduction to molecular diagnostics of aquatic organisms. Main challenges and their solutions. A2: Genome organization and regulation of gene expression in Procaryota. A3: Genome organization and regulation of gene expression in Eucaryota. A4: Collection and storage of biological material for further diagnostics. A5: Isolation and storage of nucleic acids. block 2 A6: Cytogenetic diagnostics in aquaculture - obtaining chromosome preparations, microscopic analysis of hybrid chromosomes, chimeras, polyploids, identification of sex chromosomes, chromosome aberrations and polymorphisms. Chromosome staining and fluorescence in situ hybridization (FISH) technique. A7: Application of PCR technique in molecular diagnostics in aquaculture. A8: DNA sequencing methods and their application in research on aquatic organisms. A9: Histological techniques in the study of fish diseases and reproduction. A10: RT-PCR gene expression studies in environmental and toxicological studies. block 3 A11: Pathogens and main diseases in aquaculture - VHS, IPN, IHN viruses: symptoms and consequences. A12: Bacterial diseases of aquatic organisms. A13: Application of vaccination of fish and invertebrates reared under controlled conditions. A14: Molecular diagnosis of fish diseases from PCR to RT-PCR A15: Molecular identification of aquaculture food

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
exam part 1	51.0%	50.0%
exam part 2	51.0%	50.0%

Recommended reading

Basic literature	A.1. used during classes Maj-Paluch, J., Richert R. 2016. Characteristics of salmonid infectious pancreatic necrosis virus and its identification. Med. Veter. 72(4), 222- 225. Fadaeifard F., et al. 2013. Multiplex PCR assay for detection of VHS, IPN and IHN in eyed egg, fry and broodstock of rainbow troutJ Pure Apll Microbiol. 7(4); 2838-2844. Cunnigham C.O. 2002. Molecular diagnosis of fish and shellfish diseases: present status and potential use in disease control. Aquaculture. 206; 19- 55. Moreira M. et al. 2021. Fish pathology research in aquaculture of farmed fish; a proteomic perspective. Animals. 2021 Jan 8. Haghighi Khiabanian asl, A. et al. 2008. Diagnosis of viral hemorrhagic septicemia (VHS) in Iranian rainbow trout aquaculture by pathology and molecular techniques. Bull. Euro. Fish Pathol. 28(5), 2008, 170. Piotr Węgleński, Molecular Genetics, PWN Scientific Publishing House, 2008 Jerzy Bal, Molecular biology in medicine, Wydawnictwo Naukowe PWN 2008 Pisano E., Ozouf-Costaz C., Foresti F., Kapoor BG, Fish Cytogenetics. Science Publisher, 2007. Charon K.M., Świtoński M. Animal genetics. PWN Scientific Publishing House. 2008. Overturf K. Molecular research in Aquaculture. Wiley. 2007. Demska-Zakęś K. Innovative techniques for biological assessment and protection of valuable species of farmed fish and crayfish. IRS Publishing House. 2008 A.2. studied independently by the student Scientific articles published in the Journal of Fish Disease, Aquaculture, Aquaculture Research, Aquaculture International, etc. Scientific Reports, PloS One, etc.
Supplementary literature	Scientific articles published in journals in the field of genomic and genetic engineering.
eResources addresses	

Example issues/ example questions/ tasks being completed	Chromosome analysis of interspecific fish hybrids - discussion of chromosomal aberrations in hybrid cells.
Work placement	Not applicable

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