University of Gdańsk

Subject card

Subject name and code	Reproductive biotechnology - lecture, PG_00192673						
Field of study	Marine Biotechnology						
Date of commencement of studies	October 2027		Academic year of realisation of subject	2027/2028			
Education level	Master's studies		Subject group	Obligatory subject group in the field of study Subject group related to scientific research 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	2		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		2.0	18.0	50	
Subject objectives	The general aim of the course is to provide students with in-depth knowledge of the biological basis of reproduction of fish and aquatic invertebrates as well as information on progress in the reproductive technology of organisms bred in aquaculture and model organisms. The student will gain knowledge about the tools used for assisted fish reproduction in aquaculture and the connections between biotechnological reproductive methods and research in the area of developmental biology, molecular biology, and genetic engineering.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[MBMU2-KK04] Is ready to assess and understand the risks and dilemmas, including ethical dilemmas associated with conducting scientific research and introduction of advanced technologies; understands and appreciates the importance of intellectual property; acts ethically	Has the ability to assess and understand ethical dilemmas and threats related to research focusing on reproductive biotechnology and modern reproductive techniques.	[SK1] oral statement/conversation/ discussion [SK2] presentation/project/paper/ report
[MBMU2-KU01] Can plan and conduct research in the laboratory and at sea, and to document procedures and results. Independently or under the supervision of an authorized staff member, carries out work using specialized equipment. Complies with occupational health and safety regulations.	Has the ability to plan and conduct research on fish reproduction and gamete biotechnology in the laboratory, documenting experiments and their results; is able to draw conclusions based on the results obtained during work laboratory.	[SU6] demonstration of practical skills
[MBMU2-KW02] Has an in-depth knowledge of the possibilities of biotechnological use of marine resources	Has extensive knowledge and understanding of vertebrate reproduction water and reproductive technologies used for their breeding in control conditions.	[SW4] test/exam - oral or written

Subject contents

A1: Embryogenesis of fish and marine invertebrates. Maternal-embryonic transition. A2: Gametogenesis in fish. A3: Gamete quality and short- and long-term sperm storage/preservation. A4: Molecular and physiological aspects of fertilization. A5: Genetic and environmental sex determination. A6: Gonadal differentiation and sexual maturation. A7: Hormonal and environmental control of gonadal differentiation and sexual maturation. A8: Induced androgenesis, gynogenesis and polyploidization. A9: Transgenesis in invertebrates and aquatic vertebrates. A10: Genome editing from morpholino to CRISPR. A11: Chimerism and primary transfer of germ cells. A12: Production of single-sex fish stocks. A13. Interspecific hybridization. A14: Production of clonal and isogenic fish lines. A15: Stem cells and their use in fish reproductive biology

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	Wang H et al. 2018. Sex control in aquaculture. Wiley-Blackwell. Pandian T,J. Koteeswaran R. 1998. Ploidy induction and sex control in fish. Hydrobiologia 384, 167-243. Piferrer F. et al. Polyploid fish and shellfish: production, biology and application to aquaculture for performance improvement and genetics containment. Okoli A.S. et al. 2021. Sustainable use of CRISPR/Cas in fish aquaculture: the biosafety perspective. Transgenic Research 31:1-21. Overturf K. 2007. Molecular research in Aquaculture. Wiley-Blackwell Dunham R.2004. Aquaculture and Fisheries Biotechnology. Genetic approach. CABI Publishing. John Liu. 2007. Aquaculture Genome Technologies. Wiley-Blackwell De Siqueira-Silva et al. 2018. Biotechnology applied to fish reproduction: tools for conservation. Fish Physiology and Biochemistry 44, 1469-1485. Zwierzchowski L (ed). 1997. Animal biotechnology. Ed. Scientific PWN.. Demska-Zakęś K. 2008. Innovative techniques for biological assessment and protection of valuable species of farmed fish and crayfish. IRŚ Publishing House.
Supplementary literature	Hwa Jin Y et al. 2021. Surrogate broodstock to enhance biotechnology research and applications in aquaculture. Aquaculture Advances 49(2021)107756 Scientific articles published in journals in the field of genomic and genetic engineering.
eResources addresses	

Example issues/ example questions/ tasks being completed

Presentation of two-step method for generation of clonal lines in fish using genome engineering apprach

Work placement

Not applicable

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