University of Gdańsk

Subject card

Subject name and code	Hydraulic and General Engineering in Aquaculture - lecture, PG_00201275		
Field of study	Aquaculture – Business And Technology		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study Subject group related to practical vocational preparation
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	practical	Assessment form	credit
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	dr inż. Marcin Kuciński	
	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
1. Familiarizing students with the organization of a fish breeding center, with particular emphasis on hatchery infrastructure and water management systems, 2. Introducing students to the basics of designing fish farming ponds and hydraulic structures used in aquaculture, 3. Organizing work during the construction of a fish production facility.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[AKWAL3-U02] can make observations and perform simple physical / biological / chemical measurements that are typical in socio-economic activity based on natural sciences	Students are able to conduct observations and perform basic physical/biological/chemical measurements, which are helpful during the design of aquaculture farming facilities.	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written
[AKWAL3_W01] has an advanced understanding of the links between achievements in selected fields of science and natural science disciplines, and their potential applications in socio-economic life	Students are familiar with and understand the connections between the achievements of selected technical and natural science disciplines and their potential applications in aquaculture production facilities.	[SW4] test/exam - oral or written
[AKWAL3_W02] has an advanced understanding of chemical, biological, physical processes and phenomena, identifies them, analyses their mechanisms in relation to the aquatic environment, and is aware of the connections between various natural disciplines	Students are familiar with and understand chemical, biological, and physical processes and phenomena. Students are able to identify and analyze their course concerning the aquatic environment and the process of utilizing it to improve fish production. Additionally, they are aware of the connections between various natural science disciplines.	[SW4] test/exam - oral or written
[AKWAL3_W06] has an advanced understanding of techniques, research methods and tools used in aquaculture	Students are familiar with and discuss techniques, research methods, and tools used in designing fish farming facilities in aquaculture.	[SW4] test/exam - oral or written

Subject contents

1. Construction materials,

2. Water balance and supply of water to the breeding center: water intakes, pumping installations, water conveyance and distribution systems,

3. Categories of breeding facilities and types of ponds in aquaculture,

4. Construction of hatchery and nursery facilities and basic principles of their design,

5. Hydraulic structures allowing control of water inflow and outflow, methods of reinforcing watercourses and artificial water channels,

6. Earthwork structures for damming and protective purposes,

7. Construction of fish capture and holding devices, transportation structures, and fish passages,

8. Construction and operation of pumps and water power plants,

9. Construction and operation of devices for water aeration,

10. Equipment for water purification in aquaculture.

Prerequisites and co-requisites

Basic knowledge of mathematics, physics, chemistry, and hydrology. Proficiency in computer operation, Microsoft Office suite, and handling any graphic design software.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Activity in classes - engagement in discussions	51.0%	25.0%
Test	51.0%	75.0%

Recommended reading	Basic literature	1. Budownictwo rybackie. Autor: Czesław Król. Wydawca: Państ. Wydaw. Rolnicze i Leśne (1986). ISBN: 83-09-01043-5, 83-09-10043-5; 2. Ryszard Wojda, 2015 - Chów i hodowla karpia. Wyd. IRS, s. 457; 3. K. Goryczko, J. Grudniewska 2015 Chów i hodowla pstrąga tęczowego Wyd. IRS, 2015, s. 173; 4. Ryszard Kolman, 2010 - JESIOTRY. Chów i hodowla. Poradnik hodowcy. II wydanie, Rozszerzone i poprawione, Wyd. IRS, s. 134. 5. Ebeling, J. M., Timmons, M. B., & Ebeling, J. M. (2010). Recirculating aquaculture. Cayuga Aqua Ventures. 6. Burzyńska-Szyszko M. Materiały konstrukcyjne. 2011 Warszawa. ISBN 83-89703-73-4. 7. Ciszewski A., Radomski T., Szumer A., Materiałoznawstwo, OWPW, Warszawa, 1998. 8. Kaczorowski M, Krzynska A., Konstrukcyjne materiały metalowe, ceramiczne i kompozytowe, OWPW, Warszawa, 2008. 9. Guziur J., Białowąs H., Milczarzewicz W. 2002. Rybactwo stawowe. Wyd. HOŻA. Warszawa.
	Supplementary literature	Articles on the construction and management of fish breeding centers can be found in industry-specific journals such as Aquaculture Engineering, Aquaculture International, Komunikaty Rybackie, and others.
	eResources addresses	

Example issues/ example questions/ tasks being completed	1. Basic classification of construction materials; 2. Discussion of mechanical properties of materials; 3. Criteria for selecting construction materials; 4. Characteristics of construction materials used for building aquaculture production facilities; 5. Basics of hydraulics; 6. Hydraulic basics for designing water supply installations for breeding centers; 7. Division and characteristics of water system solutions used in aquaculture production facilities; 8. Construction and characteristics of water devices in water supply and distribution systems in breeding facilities; 9. Division and characteristics of water intakes for aquaculture purposes; 10. Basic division and characteristics of aquaculture breeding facilities; 11. Division and characteristics of pond/basin categories used in trout and carp breeding facilities; 12. General characteristics of hatchery-nursery facilities including hatchery equipment, manipulation rooms, and auxiliary rooms; 13. Description of technical solutions for water heating; 14. Determination of maximum water demand for a hatchery-nursery facility; 15. Basic guidelines for designing hatchery buildings; 16. Nursery methods for fish rearing; 17. Division, construction, and characteristics of damming and protective structures in aquaculture; 18. Characteristics of water intakes and outlets in aquaculture; 19. Construction and characteristics of flow regulation structures used in aquaculture; 20. Characteristics of reinforcement methods for watercourses and artificial water channels in breeding centers; 21. Division and characteristics of sluices, inlet structures, and outlets in pond breeding facilities; 22. Types and construction of fish capture and storage devices in breeding facilities; 23. Types and designs of transportation structures in breeding facilities; 24. Types and construction of fish passages;

	25. Types of earth embankments used in pond breeding facilities; 26. Designing and building earth embankments; 27. Types, construction, and operation principles of water oxygenation structures used in aquaculture; 28. Types, construction, and efficiency of pumps used in aquaculture; 29. Principles for selecting pumps; 30. Types and construction of devices and structures used for post-production water treatment in aquaculture.
Work placement	Not applicable

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