

**Subject card**

<b>Subject name and code</b>	Hydraulic and general engineering in aquaculture - lectures, PG_00075888						
<b>Field of study</b>	Aquaculture – Business And Technology						
<b>Date of commencement of studies</b>	October 2024	<b>Academic year of realisation of subject</b>			2024/2025		
<b>Education level</b>	undergraduate studies	<b>Subject group</b>					
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	1	<b>Language of instruction</b>			Polish not applicable		
<b>Semester of study</b>	2	<b>ECTS credits</b>			2.0		
<b>Learning profile</b>	practical	<b>Assessment form</b>					
<b>Conducting unit</b>	Pracownia Akwakultury -> Katedra Biologii Morza i Biotechnologii -> Faculty of Oceanography and Geography						
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr inż. Marcin Kuciński				
	<b>Teachers</b>						
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
	Additional information: Lecture with multimedia presentation,  Discussion.						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	<b>Number of study hours</b>	30		10.0		15.0	55
<b>Subject objectives</b>	<p>1. Familiarizing students with the organization of a fish breeding center, with particular emphasis on hatchery infrastructure and water management systems,</p> <p>2. Introducing students to the basics of designing fish farming ponds and hydraulic structures used in aquaculture,</p> <p>3. Organizing work during the construction of a fish production facility.</p>						

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] knows and understands the relationship between the achievements in the selected fields of science and disciplines of natural sciences, and the possibility of their application 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_W06] knows and discusses 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
	[AKWAL3_W02] knows and understands 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
Subject contents	<p>1. Construction materials,</p> <p>2. Water balance and supply of water to the breeding center: water intakes, pumping installations, water conveyance and distribution systems,</p> <p>3. Categories of breeding facilities and types of ponds in aquaculture,</p> <p>4. Construction of hatchery and nursery facilities and basic principles of their design,</p> <p>5. Hydraulic structures allowing control of water inflow and outflow, methods of reinforcing watercourses and artificial water channels,</p> <p>6. Earthwork structures for damming and protective purposes,</p> <p>7. Construction of fish capture and holding devices, transportation structures, and fish passages,</p> <p>8. Construction and operation of pumps and water power plants,</p> <p>9. Construction and operation of devices for water aeration,</p> <p>10. Equipment for water purification in aquaculture.</p>		
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	<p>1. Budownictwo rybackie. Autor: Czesław Król. Wydawca: Państw. Wydaw. Rolnicze i Leśne (1986). ISBN: 83-09-01043-5, 83-09-10043-5;</p> <p>2. Ryszard Wojda, 2015 - Chów i hodowla karpia. Wyd. IRS, s. 457;</p> <p>3. K. Goryczko, J. Grudniewska 2015 Chów i hodowla pstrąga tęczowego Wyd. IRS, 2015, s. 173;</p> <p>4. Ryszard Kolman, 2010 - JESIOTRY. Chów i hodowla. Poradnik hodowcy. II wydanie, Rozszerzone i poprawione, Wyd. IRS, s. 134.</p> <p>5. Ebeling, J. M., Timmons, M. B., &amp; Ebeling, J. M. (2010). Recirculating aquaculture. Cayuga Aqua Ventures.</p> <p>6. Burzyńska-Szysko M. Materiały konstrukcyjne. 2011 Warszawa. ISBN 83-89703-73-4.</p> <p>7. Ciszewski A., Radomski T., Szumer A., Materiałoznawstwo, OWPW, Warszawa, 1998.</p> <p>8. Kaczorowski M, Krzynska A., Konstrukcyjne materiały metalowe, ceramiczne i kompozytowe, OWPW, Warszawa, 2008.</p> <p>9. Guziur J., Białowas H., Milczarzewicz W. 2002. Rybactwo stawowe. Wyd. HOŻA. Warszawa.</p>
	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	Adresy na platformie eNauczanie:

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;

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

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