University of Gdańsk

Subject card

Subject name and code	Application of RAS Technology - laboratory classes, PG_00201323		
Field of study	Aquaculture – Business And Technology		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
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	2	Language of instruction	Polish
Semester of study	3	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	0.0	0.0	30.0	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	3.0	17.0	50

Subject objectives

1. Introducing students to fish production technology in closed-loop water systems.

2. Familiarizing students with methods of controlling production conditions and technical solutions used for this purpose in closed-loop water systems.

3. Providing an overview of the basics of designing closed-loop water systems for aquaculture production purposes.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[AKWAL3_W06] has an advanced understanding of techniques, research methods and tools used in aquaculture	Students are familiar with and discuss techniques, methods, and tools used in fish farming utilizing recirculation systems in aquaculture.	[SW4] test/exam - oral or written
[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 simple physical/biological/chemical measurements, which are helpful during the design and operation of Recirculating Aquaculture Systems.	[SU2] presentation/project/paper/ report
[AKWAL3-U06] can apply basic techniques and technological processes related to the use of elements of the environment for practical purposes	Students are able to apply basic techniques and technological processes related to utilizing elements of the aquatic environment for fish farming purposes.	[SU2] presentation/project/paper/ report
[AKWAL3-K04] is ready to identify and recognize dilemmas connected with the profession and understands the need to improve professional competence	Students are ready to identify and recognize dilemmas associated with future roles as production managers in RAS aquaculture facilities and understand the need for continuous improvement of their professional competencies.	[SK2] presentation/project/paper/ report [SK8] observation of student's independent or team work

Subject contents

1. Principles of designing semi-closed and closed systems dedicated to the production of various fish species.

2. Determining stocking densities, designing cultivation basins, and settlers.

3. Designing biofilters. Designing the hydraulic water distribution system.

4. Environmental conditions control in production buildings and designing aquaponic systems.

5. Demonstrating RAS-type systems in fish farming in Poland.

Prerequisites and co-requisites

Basic knowledge of mathematics, physics, and chemistry. Proficiency in MS Office suite and familiarity with operating any graphic design software.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Activity during classes - engagement in discussions undertaken	51.0%	25.0%
Completion of a comprehensive project for a RAS recirculation system designed for the cultivation of any fish species.	51.0%	75.0%

Recommended reading

Basic literature	1. Bregnballe J. 2015. A Guide to Recirulation Aquaculture. FAO/ Eurofish http://www.fao.org/3/a-i4626e.pdf, 2. Ebeling, J. M., Timmons, M. B., & Ebeling, J. M. (2010). Recirculating aquaculture. Cayuga Aqua Ventures.
Supplementary literature	Articles on the construction and management of fish farming facilities can be found in industry journals such as Aquaculture, Aquaculture International, Aquaculture Research, Komunikaty Rybackie, etc.
eResources addresses	

Example issues/ example questions/ tasks being completed	1. List the basic processes and operations constituting the functioning of the RAS (Recirculating Aquaculture System). 2. List the essential technical components necessary for the proper operation of the RAS. 3. Enumerate the advantages and disadvantages of RAS recirculation systems for aquaculture production purposes. 4. Explain the difference between a closed system and a semi-closed system. 5. Explain the difference between the aeration and oxygenation processes in water. 6. List and characterize the main technological solutions for enriching water with oxygen. 7. List and characterize the main technological solutions for removing sediment from production water. 8. List and characterize the main technological solutions of biofiltration used in RAS recirculation systems. 9. List and characterize the main technological solutions for water sterilization used in RAS water recirculation systems. 10. List and characterize the main technological solutions for monitoring and controlling the operation of RAS recirculation circuits. 11. List and characterize the main technological solutions for pumping and distributing water in the RAS. 12. List the types of cultivation basins used in RAS recirculation systems. 13. List the advantages and disadvantages of using large production basins with a large volume in RAS recirculation systems. 14. What is an aquaponic system? 15. List and characterize the basic processes and operations constituting the functioning of an aquaponic system.
Work placement	Not applicable

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