University of Gdańsk

Subject card

Subject name and code	Application of RAS Technology - lecture, PG_00201324		
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	1.0
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	15.0	0.0	0.0	0.0	0.0	15
	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	15	2.0	8.0	25

Subject objectives
1. Introduction of students to fish production technology in recirculating aquaculture systems, 2. Introduction of students to methods of controlling production conditions and technical solutions used for this purpose in recirculating aquaculture systems, 3. Presentation of the basics of designing recirculating water systems intended for aquaculture production.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[AKWAL3_W03] has an advanced understanding of the conceptual categories and terminology related to the biological basis of aquatic organisms breeding, as well as concepts directly relevant to the practical applications of this knowledge	Students know and understand the conceptual categories and terminology related to the biological foundations of RAS technology and the cultivation of aquatic organisms in controlled conditions, as well as concepts that have direct relevance to the practical applications of this knowledge.	[SW4] test/exam - oral or written
[AKWAL3-W12] knows and understands the role of aquaculture in the modern economy and its impact on the natural environment	Students know and understand the role of aquaculture fish farming systems in recirculating systems within the modern economy and their impact on the natural environment.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion
[AKWAL3-K04] is ready to identify and recognize dilemmas connected with the profession and understands the need to improve professional competence	Students are prepared to identify and recognize dilemmas associated with the future role of a production manager in recirculating aquaculture system (RAS) facilities, and understands the need for continuous professional development.	[SK1] oral statement/conversation/ discussion
[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, and chemical measurements useful for the design and operation of RAS recirculating systems.	[SU1] oral statement/conversation/ discussion

Subject contents

1. Introduction to the technology of aquatic organism production in recirculating systems,
2. Monitoring and control systems for RAS parameters, types of culture tanks,
3. Sedimentation, flotation, mechanical filtration, and biofiltration,
4. Gas transfer systems and water disinfection,
5. Aquaponics: technology combining aquaculture and plant production.

Prerequisites and co-requisites

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

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Class participation - engagement in discussions	51.0%	25.0%
Test	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 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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