

**Subject card**

<b>Subject name and code</b>	Nutrition and Food Science - lecture, PG_00201308						
<b>Field of study</b>	Aquaculture – Business And Technology						
<b>Date of commencement of studies</b>	October 2026	<b>Academic year of realisation of subject</b>			2027/2028		
<b>Education level</b>	Bachelor's studies	<b>Subject group</b>			Obligatory subject group in the field of study Subject group related to practical vocational preparation		
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	2	<b>Language of instruction</b>			Polish		
<b>Semester of study</b>	4	<b>ECTS credits</b>			1.0		
<b>Learning profile</b>	practical	<b>Assessment form</b>			credit		
<b>Conducting unit</b>	Laboratory of Aquaculture -> Department of Marine Biology and Biotechnology -> Faculty of Oceanography and Geography -> Rector						
<b>Name and surname of lecturer (lecturers)</b>	Subject supervisor		dr inż. Marcin Kuciński				
	Teachers						
<b>Lesson types</b>	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						
<b>Learning activity and number of study hours</b>	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	15		1.0		9.0	25
<b>Subject objectives</b>	<p>1. Introducing students to inter-species differences in the feeding behavior of various fish species and their nutritional requirements.</p> <p>2. Familiarizing students with methods of feed production and composition.</p> <p>3. Explaining the varying nutritional requirements of fish for different stages of development.</p>						

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 are familiar with and understand conceptual categories and terminology related to the biological fundamentals of fish nutrition in aquaculture conditions, as well as concepts directly relevant 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 are familiar with and understand the role of fish nutrition in aquaculture, as well as the relationship between the level of feeding intensity and the quality of the feed used, as well as the level of pollutants generated, which may potentially impact the natural environment.	[SW4] test/exam - oral or written
	[AKWAL3-U06] can apply basic techniques and technological processes related to the use of elements of the environment for practical purposes	Students can apply basic techniques and technological processes related to fish feed production, utilizing elements of the environment for practical purposes.	[SU1] oral statement/conversation/discussion [SU4] test/exam - oral or written
[AKWAL3-U04] can select and use available sources of information, and understand the literature on aquaculture in a broad sense	Students are able to select and utilize available sources of information and understand literature on the broad topic of fish nutrition in aquaculture.	[SU1] oral statement/conversation/discussion [SU4] test/exam - oral or written	
Subject contents	<ol style="list-style-type: none"> <li>1. Energy requirements and processes of digestion and nutrient absorption in fish.</li> <li>2. Introduction to fish nutrition and feed science.</li> <li>3. Basic feed components: from macronutrients to micronutrients.</li> <li>4. Functional additives in fish nutrition.</li> <li>5. Industrial feed production technology.</li> </ol>		
Prerequisites and co-requisites	Basic knowledge of fish biology and physiology.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test	51.0%	75.0%
	Activity during classes - engagement in the discussions undertaken	51.0%	25.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Lovell RT. Nutrition and Feeding Fish. 1989. Wyd. Van Nostrand Reinhold, New York.</li> <li>2. Goryczko K. 2008. Pstrągi. Chów i hodowla. Wyd. Instytut Rybactwa Śródlądowego Olsztyn.</li> <li>3. Wojda R. 2009. Karpie, Chów i hodowla. Wyd. Instytut Rybactwa Śródlądowego Olsztyn.</li> <li>4. Ryszard Kolman, 2010 - JESIOTRY. Chów i hodowla. Poradnik hodowcy. II wydanie, Rozszerzone i poprawione, Wyd. IRS,</li> <li>5. Halver J. 2003. Fish nutrition. Wyd. Academic Press. New York London,</li> <li>6. Wylęgarnictwo, podchowy ryb i zarybienia. Ed. Zakęsia, Zdzisława; Demska-Zakęś, Krystyna. Instytut Rybactwa Śródlądowego, Olsztyn 2016 (ISBN 978-83-60111-86-4),</li> <li>7. Monografia: Żywnienie ryb i inne problemy akwakultury. Wylęgarnia 2020.</li> </ol>	

	Supplementary literature	<p>Articles on fish nutrition and aquaculture published in industry journals such as Aquaculture, Aquaculture International, Aquaculture Research, and Komunikaty Rybackie:</p> <ol style="list-style-type: none"> <li>1. Poczyczynski, P., &amp; Wozniak, M. (2013). Pasze sztuczne w żywieniu ryb. I. Pasze sztuczne w żywieniu ryb. I. Wprowadzenie. Komunikaty Rybackie, 3,</li> <li>2. Poczyczyński, P., &amp; Wozniak, M. (2013). Pasze sztuczne w żywieniu ryb. II. Zapotrzebowanie energetyczne ryb oraz wpływ temperatury na procesy trawienne i dawki pasz. Komunikaty Rybackie, 3,</li> <li>3. Poczyczynski, P., &amp; Wozniak, M. (2013). Pasze sztuczne w żywieniu ryb. III. Zapotrzebowanie na makroelementy białko i aminokwasy egzogenne. Komunikaty Rybackie, 3,</li> <li>4. Poczyczynski, P., &amp; Wozniak, M. (2013). Pasze sztuczne w żywieniu ryb. IV. Pozostałe makroelementy - lipidy i węglowodany. Komunikaty Rybackie, (6),</li> <li>5. Golez, N. V. (2002). Processing of feedstuffs and aquafeeds. In Nutrition in Tropical Aquaculture: Essentials of fish nutrition, feeds, and feeding of tropical aquatic species (pp. 125-147). Aquaculture Department, Southeast Asian Fisheries Development Center.</li> </ol>
Example issues/ example questions/ tasks being completed	eResources addresses	<ol style="list-style-type: none"> <li>1. Feeding strategies of fish,</li> <li>2. Basics of metabolic transformations dynamics in fish,</li> <li>3. Factors determining the energy requirements of fish,</li> <li>4. Energy requirements of fish,</li> <li>5. Energy balance of fish,</li> <li>6. Structure of the fish gastrointestinal tract,</li> <li>7. Length of the fish gastrointestinal tract,</li> <li>8. Development of the gastrointestinal system throughout the life of fish,</li> <li>9. Basics of the process of digestion and nutrient absorption in fish,</li> <li>10. Basics of enzymology of the digestion process in fish,</li> <li>11. Digestion of proteins, fats, carbohydrates, and nucleic acids in fish,</li> <li>12. Development of the enzymatic digestive apparatus in fish,</li> <li>13. Concepts of nutrition and feed science,</li> <li>14. Levels of intensification of fish production (feeding) in aquaculture,</li> <li>15. Fish feeding techniques,</li> <li>16. Methods for determining the frequency of fish feeding,</li> <li>17. When not to feed fish?</li> <li>18. Criteria for selecting fish feeds and assessing their quality,</li> <li>19. Feed conversion ratio (FCR) and fish growth rate,</li> <li>20. Micro- and macronutrients in fish diets,</li> <li>21. Importance of protein and its requirements in fish diets,</li> <li>22. Importance of lipids and their requirements in fish diets,</li> <li>23. Importance of carbohydrates and their requirements in fish diets,</li> <li>24. Importance of trace elements and their requirements in fish diets,</li> <li>25. Importance of vitamins and their requirements in fish diets,</li> <li>26. Functional additives in fish nutrition,</li> <li>27. Feed quality and its significance in aquaculture production,</li> <li>28. Basic classification and characteristics of anti-nutrients observed in feed components for fish,</li> <li>29. Characteristics of selected components for fish feed production,</li> <li>30. Basics of formulating feed mixtures,</li> <li>31. Digestibility of feed components,</li> <li>32. Amount of pollutants generated depending on the quality of feed components used,</li> <li>33. Methods of preliminary processing of feed components,</li> <li>34. Formation and stabilization of industrial feeds - technology of industrial feed production for fish,</li> <li>35. Methods of stabilizing aquafeeds and controlling their quality during production,</li> <li>36. Influence of starch addition on feed buoyancy.</li> </ol>
Work placement	Not applicable	

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