



WNoŻiR



<i>Field of study</i>		Aquaculture and Fisheries				
<i>Mode of study</i>		stationary	<i>Level</i>	first cycle		
<i>Graduate's qualification</i>		inżynier				
<i>Fields of science</i>		agricultural sciences				
<i>Disciplines of science</i>		animal science and fisheries (100%)				
<i>Educational profile</i>		general academic				
<i>Module</i>						
<i>Course unit</i>		Fish breeding				
<i>Code</i>		WNOZIR/AQF/S1/				
<i>Field of specialisation</i>						
<i>Administering faculty</i>		Department of Hydrobiology, Ichthyology and Biotechnology of Reproduction				
<i>ECTS</i>		5.0	<i>ECTS (forms)</i>	5.0		
<i>Form of course credit</i>		examination	<i>Language</i>	english		
<i>Electives</i>			<i>Elective group</i>			
<i>Form of instruction</i>	<i>Cod</i>	<i>Semester</i>	<i>Hours</i>	<i>ECTS</i>	<i>Weight</i>	<i>Credit</i>
laboratory course	L	4	30	2.0	0.50	credits
lecture	W	4	30	3.0	0.50	examination
<i>Leading teacher</i>		Formicki Krzysztof (Krzysztof.Formicki@zut.edu.pl)				
<i>Other teachers</i>						
<i>Prerequisites</i>						
<i>W-1</i>	Basic knowledge of fish anatomy, embryology, physiology and biology					
<i>Module/course unit objectives</i>						
<i>C-1</i>	The aim of the course is to familiarize students with the reproductive phenomena of various species of fish and aquatic invertebrates (especially crayfish) and the influence of environmental factors on embryonic and larval development (temperature, oxygen, light, magnetic field, salinity, etc.).					
<i>Course content divided into various forms of instruction</i>						<i>Number of hours</i>
<i>T-L-1</i>	Embryonic development of various species, critical periods in embryonic development, hatching - body structure of larvae of various ornamental fish species, individual behavior, critical periods in larval development. Reproduction of fishes - fertilization, embryonic development, hatch. Professional fish hatchery. Water circulation methods, eggs incubation devices.					10
<i>T-L-2</i>	Water preparation (properties and composition depending on the requirements of individual fish species, water preparation, water circulation, trace elements, pH, oxygenation, water hardness). Water quality control					10
<i>T-L-3</i>	Spawning - reproductive behavior, spawning grounds, hormonal regulation of spawning behavior of various fish species. Treatments on embryos and larvae. Hatching - appropriate environmental conditions (temperature, lighting), feeding, Production of different size of live food for hatching and fry					10
<i>T-W-1</i>	Spawning -collecting, transportation, keeping spawners, fertility, sexual dimorphism, hormonal stimulation, selection of spawning pairs. Morphophysiological basis of sexual maturation - brain, pituitary gland, ovaries. Fertility. Endocrinology of sexual maturation in fish and reproduction control. Physico-chemical factors and their impact on fish spawning and the quality of spawn obtained. Gonads - the impact of environmental factors on gonads development (light, temperature, food), gynogenesis, androgenesis, polyploidisation.					15
<i>T-W-2</i>	Reproductive biotechnics - spawning, reproductive behavior, spawning grounds, hormonal regulation of spawning behavior. Anesthetics.					15
<i>Student workload - forms of activity</i>						<i>Number of hours</i>
<i>A-L-1</i>	Participation in laboratories					30
<i>A-L-2</i>	Participation in consultations					10
<i>A-L-3</i>	Studying scientific literature on current laboratories					10
<i>A-L-4</i>	Preparation for passing the laboratories					10
<i>A-W-1</i>	Participation in lectures					30
<i>A-W-2</i>	Participation in consultations					20
<i>A-W-3</i>	Studying scientific literature					20
<i>A-W-4</i>	Preparation for passing lectures					20



Teaching methods / tools

M-1	university lecture, problem lecture exercises, demonstration, field exercises in selected modern breeding centers
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Evaluation methods (F - progressive, P - final)

S-1	F	To get credit for the course: an oral presentation is required (topics are chosen by the students and lecturer) and independent assessment of the quality of gametes, analysis of embryonic development and controlled fish reproduction in the laboratory.
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Designed learning outcomes	Reference to the learning outcomes designed for the fields of study	Reference to Learning Outcomes for qualifications at PQF 6, 7 or 8	Reference to learning outcomes for qualifications at level 6 or 7 that enable acquiring engineering competences	Course objectives	Course content	Teaching methods	Evaluation methods
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Knowledge

AQF_1A_C14_W01 The student will have knowledge how to deal with spawners, stimulate them to obtain sex products, endocrinology of sexual maturation in fish and reproduction control. The student will also obtain knowledge of the breeding behavior of fish of different species, stimulating or inhibiting the impact of environmental factors and reproductive biotechnics	AQF_1A_W08	P6S_WG		C-1	T-L-1 T-L-2 T-L-3	T-W-1 T-W-2	M-1	S-1
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Skills

AQF_1A_C14_U01 After completing the course, the student will be able to create appropriate conditions for the incubation of eggs of selected economically valuable fish and crayfish, apply appropriate care during embryogenesis as well as feed and properly care for the larvae and hatch.	AQF_1A_U01	P6S_UW	P6S_UW	C-1	T-L-1 T-L-2 T-L-3	T-W-1 T-W-2	M-1	S-1
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Social competences

AQF_1A_C14_K01 The student is aware of the responsibility for their own work and the rules of teamwork and responsibility for jointly performed tasks.	AQF_1A_K01	P6S_KK P6S_KR		C-1	T-L-1 T-L-2 T-L-3	T-W-1 T-W-2	M-1	S-1
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Outcomes	Grade	Evaluation criterion
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Knowledge

AQF_1A_C14_W01	2,0	
	3,0	The student knows the methods of obtaining and selecting spawners, knows the rules of handling the larvae and hatching of certain species of fish.
	3,5	
	4,0	
	4,5	
	5,0	

Skills

AQF_1A_C14_U01	2,0	
	3,0	After completing the course, the student will be able to properly care for the hatch and larvae of selected species of fish and crayfish.
	3,5	
	4,0	
	4,5	
	5,0	

Other social competences

AQF_1A_C14_K01	2,0	
	3,0	The student is aware of the responsibility for their own work and the rules of teamwork and responsibility for jointly performed tasks.
	3,5	
	4,0	
	4,5	
	5,0	

Required reading

- Formicki K., Kirschbaum F. (ed.), Histology of fishes, Science Publishers (CRC Press/Taylor & Francis Group),, 2019, ISBN: 9781498784474
- Munshi J.S. Dutta H.M. (ed.), Fish Morphology, Baba Barkha Nath Printers, New Delhi, 1996

Supplementary reading

- Szczerbowski, J.A. (ed.), Inland fisheries in Poland, Instytut Rybactwa Srodladowego,, Olsztyn (Poland), 1995