



Field of study	Aquaculture and Fisheries					
Mode of study	stationary	Level	first cycle			
Graduate's qualification	inżynier					
Fields of science	agricultural sciences					
Disciplines of science	animal science and fisheries (100%)					
Educational profile	general academic					
Module						
Course unit	<b>Basics of processing and preservation of aquatic food products</b>					
Code	WNOZIR/AQF/S1/					
Field of specialisation						
Administering faculty	Department of Fish, Plant and Gastronomy Technology					
ECTS	5.0	ECTS (forms)	5.0			
Form of course credit	examination	Language	english			
Electives			Elective group			
Form of instruction	Cod	Semester	Hours	ECTS	Weight	Credit
laboratory course	L	6	30	2.0	0.50	credits
lecture	W	6	30	3.0	0.50	examination
Leading teacher	Tokarczyk Grzegorz (Grzegorz.Tokarczyk@zut.edu.pl)					
Other teachers						
<b>Prerequisites</b>						
W-1	Basic knowledge of fish taxonomy, food chemistry and food technology					
<b>Module/course unit objectives</b>						
C-1	Getting to know with physico-chemical and technological suitability of fish, crustaceans and molluscs.					
C-2	The transfer of processing skills of aquatic food products and the use of various methods for this purpose.					
C-3	Learning self-solve complex problems related to the processing of edible fish and aquatic invertebrates for food.					
<b>Course content divided into various forms of instruction</b>					<b>Number of hours</b>	
T-L-1	The yield of total edible flesh from fish					3
T-L-2	Technology of minced meat					2
T-L-3	Heat treatment of fish, crustaceans and molluscs - physical and chemical changes					3
T-L-4	Effect of the pretreatment on the quality of fish					2
T-L-5	Technology of bread and batter products					2
T-L-6	Effect of mixed method and additives on the quality of minced meat					2
T-L-7	Salted fish technology					4
T-L-8	Marinated fish technology					4
T-L-9	Technology of fishburgers					2
T-L-10	Technology of canned fish and other aquatic organisms.					4
T-L-11	Smoked fish technology.					2
T-W-1	Raw materials and raw products. Properties of aquatic materials.					2
T-W-2	Fishing gear					1
T-W-3	Handling at harvest					1
T-W-4	Processing systems. Finfish, crustacean and molluscs processing system.					2
T-W-5	Quality changes in aquatic food products					4
T-W-6	Unit processes: washing, sorting, scaling, heading, picking, peeling, evisceration, filleting, skinning, cutting, block formation, breading, frying, retorting, meat-bone separation.					4
T-W-7	Heat processing: blanching, canning, retorting.					4
T-W-8	Refrigerated processes					4
T-W-9	Other preservation methods: salting, drying, smoking, fermented products, irradiation, modified atmosphere and vacuum packaging					4
T-W-10	Packaging					2
T-W-11	Waste production and management					1

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Course content divided into various forms of instruction		Number of hours
T-W-12	Aquatic by-products	1

Student workload - forms of activity		Number of hours
A-L-1	class attendance	30
A-L-2	preparation for the test	5
A-L-3	preparation for laboratory classes	5
A-L-4	analysis of the results obtained in the lab	5
A-L-5	writing a lab report	5
A-L-6	studying the literature on the subject	5
A-L-7	consultation with the teacher	5
A-W-1	class attendance	30
A-W-2	preparation for the exam	15
A-W-3	contact time with teacher	15
A-W-4	studying the appropriate literature	30

Teaching methods / tools	
M-1	Expository methods (lecture, explanation or clarification)
M-2	Activity method (discussion related to the lecture)
M-3	Exposing method (movie related to the lecture)
M-4	Practical method (demonstration, workshop and laboratory)

Evaluation methods (F - progressive, P - final)		
S-1	F	formative - continuous assessment
S-2	F	formative - observation of students activity during laboratories
S-3	P	summarising - written or oral exam

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_C22_W01 Student is able to recognize and characterize aquatic organisms used in the fishing industry. Is able to properly choose the type of pre-treatment and the method of protecting the raw material against deterioration. He can explain the processes occurring in the raw material after its acquisition, before and after the processing. He can propose the appropriate technological process depending on the type of raw material and its properties.	AQF_1A_W01 AQF_1A_W05 AQF_1A_W11 AQF_1A_W15	P6S_WG	P6S_WG	C-1 C-2 C-3	T-L-2 T-L-5 T-L-7 T-L-10 T-L-11 T-W-1 T-W-4 T-W-5 T-W-6 T-W-7 T-W-9	M-1 M-2 M-3 M-4	S-1 S-3

Skills							
AQF_1A_C22_U01 The student is able to organize a work station for himself and a group of people taking part in classes. He is able to assign tasks to individual team members in a proper way, he is able to organize work in a team and supervise it to realise the work schedule. He is aware of the benefits of constantly acquiring skills. Student properly uses the acquired knowledge while performing the tasks entrusted. He is able to solve problems arising during the implementation of tasks and to use appropriate methods and materials for this purpose. Able to use the available methods and equipment for treatment and processing of fish raw material depending on its type.	AQF_1A_U01 AQF_1A_U02 AQF_1A_U04 AQF_1A_U05 AQF_1A_U24	P6S_UK P6S_UO P6S_UU P6S_UW	P6S_UW	C-2 C-3	T-L-3 T-W-4 T-W-5 T-W-6 T-W-7 T-W-8 T-W-9 T-W-10 T-W-11 T-W-12	M-1 M-3 M-4	S-1 S-3

Social competences							
AQF_1A_C22_K01 The student properly uses the acquired knowledge and skills in the implementation of the tasks entrusted to him. He can responsibly solve problems and tasks set before him. He independently makes decisions related to the implementation of tasks. He is creative and open to suggestions, follows ethical principles and is not afraid to express his opinion. He is aware of the need to constantly acquire knowledge.	AQF_1A_K01 AQF_1A_K02 AQF_1A_K03 AQF_1A_K05 AQF_1A_K06	P6S_KK P6S_KO P6S_KR		C-3	T-L-1 T-L-2 T-L-4 T-L-5 T-L-7 T-L-8 T-L-9 T-L-10 T-L-11 T-W-2 T-W-3 T-W-4	M-1 M-2 M-3 M-4	S-1



Outcomes	Grade	Evaluation criterion
<b>Knowledge</b>		
AQF_1A_C22_W01	2,0	Student is not able to recognize aquatic organisms, is not able to choose the right type of pre-treatment or how to protect it against deterioration. He cannot explain the basic processes occurring in the raw material after its catch and during processing. He cannot choose the appropriate method of processing the raw material.
	3,0	Student is able to recognize the majority of aquatic organisms, select some types of pre-treatment and methods of its protection against deterioration. He can explain some of the processes taking place in the raw material after its catch and during processing. Correctly selects some methods of raw material processing.
	3,5	Student recognizes water organisms, selects the appropriate type of pre-treatment and the method of its protection against deterioration. He can explain the basic processes occurring in the raw material after its catch and during processing. Correctly selects the appropriate method of raw material processing.
	4,0	Student recognizes water organisms, selects the appropriate type of pre-treatment, the method of its protection against deterioration and can explain the choice he did. He understands and can explain the processes occurring in the raw material after its catch and during processing. He properly selects the right way of processing the raw material.
	4,5	Student recognizes all aquatic organisms used in the food industry, selects the appropriate type of pre-treatment, the method of its protection against deterioration and is able to explain the choice he did. He easily compares the effectiveness of the proposed methods and the benefits of their application. He understands and is able to explain and connect the processes occurring in the raw material after its catch and during processing. He properly selects the appropriate method of raw material processing and can predict the final effect obtained depending on the raw material used.
	5,0	Student recognizes all aquatic organisms used in the food industry, selects the appropriate type of pre-treatment, the method of its protection against deterioration and is able to explain the choice he did. He easily compares the effectiveness of the proposed methods and the benefits of their application. He understands and is able to explain and connect the processes occurring in the raw material after its catch and during processing. He properly selects the right way of processing of the raw material. He is able to predict the final effect obtained depending on the raw material used, and independently proposes appropriate techniques and operations to be needed to process the raw material.
<b>Skills</b>		
AQF_1A_C22_U01	2,0	Student is not able to organize a workplace or supervise the work in a team. He is not able to use the acquired knowledge to solve problems. Cannot use any methods or materials to solve the problem. He is not able to use any methods and devices for the treatment and processing of water raw material.
	3,0	Student is able to organize a workplace for himself. He uses only part of the acquired knowledge to solve the encountered problems. He can use some methods and materials to solve the problem. He uses some of the methods and devices for treatment and processing of water raw material.
	3,5	Student is able to organize a workplace for himself and the team members. He can plan work for himself and a team. He uses the acquired knowledge to solve the problems encountered. He can use methods and materials to solve the problem and explain his own choice. He properly uses methods and devices for the treatment and processing of water raw material.
	4,0	Student is able to organize a workplace for himself and team, as well as plan work for himself and a team of colleagues. He uses the acquired knowledge to solve encountered problems and is able to explain a given problem theoretically and discuss it. He can use methods and materials to solve the problem and explain his own choice. He properly uses methods and devices for the treatment and processing of water raw material and proposes a solution to the problem himself.
	4,5	Student is able to organize a workplace for himself and team, as well as plan work for himself and a team of colleagues. He uses the acquired knowledge to solve encountered problems and is able to explain a given problem theoretically and discuss it. He properly estimates the benefits and negative effects of the method of processing of the raw material. He can use methods and materials to solve the problem and explain his own choice. He properly uses methods and devices for the treatment and processing of water raw material and proposes a solution to the problem himself. He makes his own decisions.
	5,0	Student is able to organize a workplace for himself and team, as well as plan work for himself and a team of colleagues. He proposes the use of appropriate tools to improve the work of the team. He uses the acquired knowledge to solve encountered problems and is able to explain a given problem theoretically and discuss it, and also proposes alternative ways to solve the problem. He properly estimates the benefits and negative effects of the method of processing of the raw material. He can use methods and materials to solve the problem and explain his own choice. He properly uses methods and devices for the treatment and processing of water raw material and proposes a solution to the problem himself. He makes his own decisions and is aware of his choice.
<b>Other social competences</b>		
AQF_1A_C22_K01	2,0	Student is not able to use the acquired knowledge and skills to carry out the tasks assigned to him. He is not able to responsibly solve problems and tasks presented to him. He cannot make decisions about a given problem. He is not creative and does not act ethically. He is unable to express his own opinion and is not aware of the constant acquisition of knowledge.
	3,0	Student partially uses the acquired knowledge and skills to carry out the tasks assigned to him. He can solve problems and tasks given to him. He is quite creative and ethical. He expresses his own opinion on some problems. He is aware of the constant acquisition of knowledge.
	3,5	Student uses the acquired knowledge and skills to carry out the tasks assigned to him. He can solve problems and tasks given to him. He makes decisions on minor matters. He is creative and ethical. He expresses his own opinion on some problems. He is aware of the continuous acquisition of knowledge and he educates himself.
	4,0	Student uses the acquired knowledge and skills to carry out the tasks assigned to him. He can solve problems and tasks given to him. He makes his own decisions. He is creative and ethical. He can express his own opinion on the arisen problems. He is aware of the continuous acquisition of knowledge and he educates himself.
	4,5	Student uses the acquired knowledge and skills to carry out the tasks assigned to him. He solves problems and tasks assigned to him on his own. He makes his own decisions and is able to estimate the consequences of his decisions. He is creative and ethical. He expresses his own opinion on the arisen problems. He is aware of the continuous acquisition of knowledge and he educates himself.
	5,0	Student uses the acquired knowledge and skills to carry out the tasks assigned to him. He solves problems himself and the tasks given to him, proposes alternative solutions to the problem. He makes his own decisions and is able to estimate the consequences of his decisions. He is creative and ethical. He expresses his own opinion on the problems and is consistent in it. He is aware of the continuous acquisition of knowledge and he educates himself.

### Required reading

1. I.R. E. Martin, E. P. Carter, G. J. Flick, Jr., L. M. Davies (Eds.), Marine & Freshwater Products Handbook, Technomic Publishing Company, Inc., 851 New Holland Avenue, Box 3535, Lancaster, PA 17604, USA, 2000
2. E. G. Bligh (Ed.), Seafood Science And Technology, Fishing News Books. Canadian Institute of Fisheries Technology. A division of Blackwell Scientific Publications Ltd, 1992
3. Zdzislaw E . Sikorski, Chemical and Functional Properties of Food Components, CRC Press, 2006, Third Edition



*Required reading*

4. Venugopal V. (Ed.), *Seafood Processing. Adding Value Through Quick Freezing, Retortable Packaging, and Cook-Chilling*, CRC Press Taylor & Francis Group, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742, 2006

*Supplementary reading*

1. F. W. Wheaton, T. B. Lawson, *Processing Aquatic Food Products*, John Wiley & Sons, Inc. USA., USA, 1985

2. Albert Ibarz, Gustavo V. Barbosa-Cánovas, *Unit Operations In Food Engineering*, CRC Press LLC, 2000 N.W. Corporate Blvd., Boca Raton, Florida 33431, 2003

3. Raul Perez Galvez, Jean-Pascal Berge, *Utilization of Fish Waste*, CRC Press Taylor & Francis Group, Boca Raton, 2013

4. A. L. Brody and J. B. Lord (Eds.), *Developing New Food Products for a Changing Marketplace*, CRC Press, 1999

5. Y.-J. Cho (Ed.), *Emerging Technologies for Food Quality and Food Safety Evaluation*, CRC Press, 2011

6. M. I. Rodrigues, A. F. Iemma (Eds.), *Experimental Design and Process Optimization*, CRC Press, 2014

7. E.W. Lucas, L.W. Rooney (Eds.), *Snack Food Processing*, CRC Press LLC, Boca Raton, 2001

8. J. Shi, C.-T. Ho, F. Shahidi, *Asian Functional Foods*, Marcel Dekker/ CRC Press, 2000 N.W. Corporate Blvd., Boca Raton, FL 33431, 2005

9. C. Ratti (Ed.), *Advances in Food Dehydration*, CRC Press, Taylor & Francis Group, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742, 2009