

PART A: COURSE PROGRAMME

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time
7.	ISCED code	0712 (Environmental protection technology)
8.	Number of semesters	4
9.	Degree	magister (Master's Degree)
10.	General characteristics of the field of study and the assumed concept of education	<p>The interdisciplinary study "Aquamatics - interdisciplinary management of the water environment" in English, with the possibility of obtaining a double diploma from both the University of Silesia and Vytautas Magnus University in Kaunas, is a response to the needs of the labor market for graduates with knowledge and competence in the broad field of water environment management. Water is an important element of the environment that significantly influences the functioning of ecosystems and societies. Increasing problems with access to good quality water resources require rational water management, based on knowledge, in accordance with principles of sustainable development. Skillful care for water and aquatic environments will help mitigate the expected effects of climate change. Water is a basic element of ecosystems, a raw material for direct consumption and industrial use. Important challenges the society must face in the era of climate change include: introducing the principles of rational management of water resources; rational management of water-related environments; protection of aquatic habitats; creating human friendly inner-city water ecosystems, i.e. blue-green infrastructure. Such activities require highly qualified staff who can deal with these problems. Managing water resources and water-related ecosystems requires comprehensive knowledge in the field of exact and natural sciences, social sciences and engineering and technical sciences. Such qualifications should include: the basics of mathematics, physics, chemistry, as well as the basics of meteorology and climatology, hydrology, hydrobiology and hydrogeology, to the extent that allows the use of this knowledge to manage aquatic environments.</p> <p>The currently observed shortage of specialists ready to take on the challenges related to water management confirms the need to prepare competent employees who will act as managers of water and water-related environments. Institutions responsible for managing water resources in Poland and Lithuania, water supply companies, water reservoir managers, local government administration units and non-governmental organizations point to a serious problem with recruiting new competent employees. An interdisciplinary study direction called "Aquamatics - interdisciplinary management of aquatic environments" (Aquamatics) is the response to the reported problems. The aim of the studies is to educate competent water environment managers who will act as a member or leader of a task group in their workplaces, characterized by independent thinking and action, based on the primacy of knowledge over emotions.</p> <p>Education in this field will be based on the following principles:</p> <ol style="list-style-type: none"> 1. mutual complementation of scientific fields in solving problems, 2. teaching students through direct involvement in practical activities and scientific research, 3. creating joint research teams between students and research staff. <p>The study program will be conducted in English at both the University of Silesia and Kaunas University. In the second semester, students beginning their studies in Kaunas will attend classes offered by specialists in Katowice, while in semester 3 all students will deepen their knowledge and competencies by completing learning outcomes at Kaunas University. An additional advantage is the optional modules offered, which will be taught by Italian specialists from the University of Trieste.</p> <p>The graduate will not only understand the problems of threats resulting from climate change and the related hydrological and hydrobiological changes, but will be prepared to look for solutions by determining the causes of environmental changes and rational assessment/prediction of the ecological/ecotoxicological effects of these changes. He/she will be able to propose effective solutions to</p>

		<p>remove/limit the effects of such activities through: inventory of surface water and groundwater as well as water-related environments; introducing effective methods of monitoring these areas, proposing and verifying the effectiveness of the corrective actions through the use of statistical and mathematical modeling methods, designing activities related to the protection and reclamation of aquatic environments, introducing modern, verified solutions related to the protection of water resources by designing small/large retention areas, creating urban areas of green and blue infrastructure and rational management of water resources, especially in the era of climate change.</p> <p>During the course, great emphasis will be placed on the ability to use basic IT tools allowing to operate in GIS and CAD environment, use databases, create maps and graphics illustrating aquatic issues. The student will also acquire the ability to analyze documents related to water management, such as: hydrotechnical designs, construction documentation, reports, expert opinions, decisions. He/she will be able to correctly evaluate the role of aquatic ecosystems, to recognize the most important species of plants and animals associated with aquatic environments and understand the relationships between them.</p>
11.	Information on the relationship between the studies and the university's strategy as well as the socio-economic needs that determine the conduct of studies and the compliance of learning outcomes with these needs	<p>The direction is in line with three important goals of the Development Strategy of the University of Silesia in Katowice for 2020-2025 in the "Education" area. These are: Objective 1: Modification of the educational offer to link it more closely with research activities, taking into account the directions for the development of higher education as presented in the Agenda for the Modernization of Higher Education: Europe - A New Vision for Development to 2025; Goal 3: Individualization of education and project-problem-based education; Goal 4: Improving the quality of education, in particular through the dissemination of modern educational methods, using new technologies based on interactivity. Among other things, the direction will include project-based classes. The purpose of these classes will be to prepare students to solve research problems through interdisciplinary research groups prepared to carry out assigned tasks. The implementation of research projects will require the student to acquire theoretical and practical knowledge of the subjects that form the core curriculum, and above this, it will enable the students to develop teamwork and project management skills, taking into account legal implications. The qualification criteria for the Aquamatics major equalize the opportunities and skills of students, who are graduates of undergraduate/ engineering various related majors, graduates of both Polish and foreign Universities. The introduction of Aquamatics as a major will allow the implementation of the following indicators of the University Development Strategy in 2020-2025: 1. preparation of new majors, conducted in foreign languages in international cooperation. Establishment of the direction of aquamatics - interdisciplinary management of aquatic environments in English with the possibility of obtaining a double diploma . 2. increase the percentage of majors, including interdisciplinary majors or specializations closely related to research conducted at the University. 3. to increase the number of research teams that include students. 4. To obtain only positive grades in PKA program evaluations. 5. To include external experts in the teaching of those majors where there is a need. The direction of Aquamatics is in line with the Priority Research Areas (POB). These are: POB 1: Harmonious human development - concern for the protection of health and quality of life; by teaching students to apply modern environmental solutions in practice, including the restoration and management of natural environments to recreate human-friendly environments. POB 2: Modern materials and technologies and their socio-cultural implications; POB 3: Environmental and climate change with its attendant challenges; through student participation in projects using advanced environmental analysis tools such as mathematical modeling, state prediction systems, and introduction of principles of good environmental practices. POB 5: Investigating the fundamental properties of nature; through student participation in fundamental research carried out in research teams.</p>
12.	Specializations	n/a
13.	General description of the specialization	
14.	The semester from which the specializations starts	n/a
15.	Percentage of the ECTS credits for each of the scientific or artistic disciplines to which the learning outcomes are related to the total number of ECTS credits (along with	<ul style="list-style-type: none"> • <i>[leading discipline]</i> Earth and related environmental sciences (natural sciences): 51% • biological sciences (natural sciences): 24% • environmental engineering, mining and energy (engineering and technology): 15% • chemical sciences (natural sciences): 10%

	the indication of the leading discipline)	
16.	Number of ECTS credits required to achieve the qualification equivalent to the level of study	120
17.	Percentage of the ECTS credits for optional modules in relation to the total number of ECTS credits	30%
18.	Total number of ECTS credits that a student must obtain in the modules taught	96
19.	Number of ECTS credits that a student must obtain in modules assigned to disciplines within the humanities or social sciences (not less than 5 ECTS) - in the case of fields of study assigned to disciplines within the fields other than, respectively, humanities or social sciences	6
20.	Number of ECTS credits - higher than 50% of the total number of credits - that a student must obtain: <ul style="list-style-type: none"> • in general university programmes within a module connected with research carried out in the scientific or artistic disciplines to develop his/her knowledge and research skills; • in practical programmes within a module to develop practical skills 	108
21.	Total number of ECTS credits that a student must obtain in internships	0
22.	Internships (hours and conditions) in the case of practical programmes and in general university programme - if such requires internship	not applicable
23.	Graduation requirements	The condition for admission to the diploma examination is to achieve the learning outcomes provided for in the study program, to obtain a certificate of an appropriate level of language proficiency in a foreign language and to obtain positive grades for the diploma dissertation. The condition for graduation is to pass the diploma examination with at least a satisfactory result. A graduate receives a higher education diploma confirming obtaining the qualifications of the appropriate degree. Detailed rules of the diploma process and the requirements for the diploma thesis are set out in the Rules and Regulations of Studies at the University of Silesia and the diploma regulations.

PART B: LEARNING OUTCOMES

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

Code of the learning outcome of the programme	Learning outcomes The graduate:	Codes of the second-order PRK characteristics to which the learning outcome of the programme is related
KNOWLEDGE		
AQ2_W01	has in-depth knowledge of exact and natural sciences and environmental engineering, enabling to development of general knowledge within the scope of water sciences	2018_P7S_WG, 2018_inż_P7S_WG
AQ2_W03	notices global civilisation challenges related to the exploitation of water resources and understands the related risks	2018_inż_P7S_WK
AQ2_W04	has in-depth knowledge of the principles of water management in the context of natural, economic, administrative, ethical and legal conditions	2018_inż_P7S_WK
AQ2_W05	knows and understands notions and principles in the field of industrial, intellectual and copyright protection	2018_inż_P7S_WK
OOD.2024_W01	The student has in-depth knowledge of selected scientific methods and knows problems characteristic of a particular field of science unrelated to the leading discipline of the study programme.	2018_P7S_WG, 2018_P7S_WK
SKILLS		
AQ2_U01	uses their knowledge to formulate theses, plan complex and non-standard experiments, calibration and validation of the obtained results, taking into consideration the ethical aspects	2018_P7S_UW
AQ2_U02	independently conducts the selection of proper methods and tools necessary to solve issues in the context of water economy	2018_P7S_UW
AQ2_U03	selects adequate sources of information, is able to use larger data resources, orders them and analyses as well as formulates them on the basis of correct conclusions	2018_P7S_UW
AQ2_U04	is able to identify and suggest the results of own research and carry out scientific discussions	2018_P7S_UK
AQ2_U06	carries out a critical analysis of the manner of functioning of advanced hydro-technical and natural solutions in water management	2018_P7S_UW
AQ2_U08	communicates with specialists, social-economic environment with the use of modern social-economic techniques of communication, using proper water sciences terminology	2018_P7S_UK
AQ2_U09	communicates clearly and comprehensibly in a foreign language at B2+ level of the Common European Framework of Reference for Languages using his/her knowledge and specialist terminology	2018_P7S_UK
AQ2_U10	is able to manage the work of interdisciplinary teams, including designing the logistics in field conditions, with care for safety and ergonomics of actions	2018_P7S_UO
AQ2_U11	skilfully enhances specialist knowledge in the field of water sciences and, at the same time, motivates the team to life-long learning	2018_P7S_UU
OOD.2024_U01	The student has advanced skills to set scientific questions and analyse problems or to solve problems practically on the basis of the course content, experience and skills gained in a particular field of science unrelated to the leading discipline of the study programme.	2018_P7S_UW
SOCIAL COMPETENCES		

AQ2_K01	is cautious and critical in assessing the obtained knowledge within the scope of water sciences and the received contents, and in the case of difficulties, is able to organise a team of experts, enabling to solve the problem	2018_P7S_KK
AQ2_K02	understands the meaning of knowledge about water in solving complicated cognitive and practical issues related to water management following the principles of sustainable development	2018_P7S_KK
AQ2_K03	initiates activities to the benefit of biotic, abiotic and social environment, and initiates actions in the public interest	2018_P7S_KO
AQ2_K04	plans team actions in an entrepreneurial manner in the current perspective and in distant time horizons	2018_P7S_KO
AQ2_K05	abides by and develops the principles of ethical conduct in life and professional work	2018_P7S_KR
OOD.2024_KS01	The student has in-depth knowledge of selected scientific methods and knows problems characteristic of a particular field of science unrelated to the leading discipline of the study programme.	2018_P7S_KK

Code of the learning outcome of the programme	Learning outcomes leading to the acquisition of engineering competences The graduate:	Codes of the second-order PRK characteristics to which the learning outcome of the programme is related
KNOWLEDGE		
AQ2_W02	knows advanced methods and techniques of monitoring water resources, as well as exploiting and distributing water	2018_inż_P7S_WG
AQ2_W06	has in-depth knowledge about the principles of creating and developing different forms of entrepreneurship related to a broadly-understood water management	2018_inż_P7S_WG, 2018_inż_P7S_WK
AQ2_W07	knows and understands advanced calculation and IT techniques and tools that support research activities in the aspect of water and environment sciences, taking into account the scope and limitations of their application	2018_P7S_WK, 2018_inż_P7S_WG
SKILLS		
AQ2_U05	is able to carry out an economic analysis of advanced hydrotechnical and natural solutions, taking into account the costs and profits for the environment	2018_inż_P7S_UW
AQ2_U07	is able to design advanced hydrotechnical and natural processes and carry out their calibration and validation, taking into account the ethical aspects	2018_inż_P7S_UW

PART C: COURSE STRUCTURE

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time
7.	Academic year for which the revised course structure applies	2025/2026

Programme modules										year 1						year 2					
								semester 1													
No.	Module	Lang.	E/C	form of teaching			Total ECTS	L	O	E	L	O	E	L	O	E	L	O	E		
				Total	L	O															
1	Elective modules for the first semester <i>*[see description below]</i>	*	*	60	30	30	6	30	30	6											
2	GIS in aquamatics	EN	C	60		60	6		60	6											
3	Hydrogeology and hydrology	EN	E	60	15	45	6	15	45	6											
4	Research management and methods	EN	C	60		60	6		60	6											
5	Water management and modelling	EN	C	60		60	6		60	6											
6	Biology in aquamatics	EN	E	60	15	45	6				15	45	6								
7	Climate change crisis management	EN	E	60	15	45	6				15	45	6								
8	Elective modules for the second semester <i>*[see description below]</i>	*	*	55	10	45	6				10	45	6								
9	Field practical classes	EN	C	60		60	6					60	6								
10	Research work 1	EN	C	60		60	6					60	6								
11	Elective modules for the third semester <i>*[see description below]</i>	*	*	60	30	30	6							30	30	6					
12	Fish resources, fishing and aquaculture	EN	E	60	30	30	6								30	30	6				
13	Hydraulic structures and hydropower	EN	E	60	30	30	6								30	30	6				
14	Research work 2	EN	C	60		60	6									60	6				
15	Technologies of wastewater treatment	EN	E	60	30	30	6								30	30	6				
16	Final work of master studies	EN	C	120		120	24											120	24		
TOTAL Programme modules:				1015	205	810	114	45	255	30	40	255	30	120	180	30	0	120	24		

Open access modules											year 1						year 2					
											semester 1			semester 2			semester 3			semester 4		
											form of teaching											
No.	Module						Lang.	E/C	Total	L	O	Total ECTS	L	O	E	L	O	E	L	O	E	
1	General academic module (Humanities)						–	C	30		30	3								30	3	

2	General academic module (Social Sciences)	–	C	30		30	3											30	3	
				TOTAL Open access modules:			60	0	60	6	0	0	0	0	0	0	0	0	60	6
				TOTAL:			1075	205	870	120	300	30	295	30	300	30	180	30		
TOTAL EXCLUDING INTERNSHIPS											1075									
TOTAL											1075									

Studia kończą się nadaniem tytułu zawodowego magistra na kierunku Aquamatics - Interdisciplinary Management of Water Environments.

* Groups of modules

Elective modules for the first semester

Description:						
Students choose one module from those offered in the module group.						
Modules:	Lang.	E/C	L	O	ECTS	
Ecosystem services in aquamatics	EN	E	8	52	6	
Environmental statistics and modelling	EN	C		60	6	
Water molecular monitoring	EN	E	40	20	6	

Elective modules for the second semester

Description:						
Students choose one module from those offered in the module group.						
Modules:						
	Lang.	E/C	L	O	ECTS	
Blue green infrastructure	EN	E	15	45	6	
CAD projects and Python programming	EN	C		60	6	
Environmental monitoring	EN	E		60	6	

Elective modules for the third semester

Description:						
Students choose one module from those offered in the module group.						
Modules:						
	Lang.	E/C	L	O	ECTS	
Innovative technological solutions in aquaculture	EN	E	35	25	6	
Remote sensing in aquamatics	EN	E	30	30	6	
Restoration of disturbed water ecosystem	EN	E	15	30	6	

Legend

Each semester consists of 15 weeks

E/C - exam/course work

E - ECTS

L - lecture, O - all forms of teaching excluding lecture (practical classes, laboratory classes, discussion classes, seminar, proseminar, language classes, field practice, workshop, internship, tutoring)

PART D: MODULES DESCRIPTION

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Biology in aquamatics
Module code		AQ_007
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The aim of the module is to familiarize the student with selected issues related to aquatic ecosystems. The module shows the properties of water and cycles of biogenic and potentially toxic elements and chemicals in aquatic environments. It presents the biotic and abiotic components of aquatic ecosystems and their interactions. Familiarizes with ecological formations and their adaptations to life in water. It presents trophic relationships in aquatic ecosystems and familiarizes with contemporary threats to their biodiversity. It presents the techniques for hydrobiological, ecological and ecotoxicological investigations.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Having basic knowledge about the properties of water and the circulation of basic elements in aquatic ecosystems.	AQ2_W01	4	
02	Knowledge of factors shaping aquatic biocoenoses and understanding the mechanisms of their impact on living organisms.	AQ2_U06	3	
AQ2_W01		3		
AQ2_W02		3		
03	Possessing knowledge about the functioning of aquatic ecosystems and understanding their trophic relationships.	AQ2_W01	3	
AQ2_W04		3		
04	Recognizing aquatic organisms using identification keys.	AQ2_W01	2	
AQ2_W02		2		
05	Identification of threats related to human activity, the ability to assess their scale and impact on the biodiversity of aquatic ecosystems	AQ2_W03	4	
06	Ability to apply hydrobiological and research techniques and methods for water quality testing	AQ2_U02	3	

		AQ2_U03	3
		AQ2_U04	3
		AQ2_U07	3
07	Ability to solve the problem in the field of aquatic ecosystems in team work and to prepare a report on the task completion.	AQ2_K01	4
		AQ2_K02	4
		AQ2_U11	4
08	Ability to promote ethical attitudes in relation to aquatic ecosystems	AQ2_K04	3
		AQ2_K05	3

9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
c06	Demonstration methods	Demonstration-imitation <i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
e01	Practical methods	Laboratory exercise / experiment <i>[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment</i>
e06	Practical methods	Observation <i>also conducted as fieldwork; a method of watching phenomena, objects or people in a systematic/planned way in order to gain knowledge about them; perceptual separation of elements of a model action as an element of learning through imitation; a complex system of cognition based on sensory experiences</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	15	exam	01, 02, 03	a01, c06
02	laboratory classes	45	course work	04, 05, 06, 07, 08	c06, d03, e01, e06

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source</i>	No

		<i>materials to be used in class</i>	
c01	Preparation for verification of learning outcomes	Determining the stages of task implementation contributing to the verification of learning outcomes <i>devising a task implementation strategy embracing the division of content, the range of activities, implementation time and/or the method(s) of obtaining the necessary materials and tools, etc.</i>	Yes
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion <i>a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course</i>	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

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5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Blue green infrastructure
Module code		AQ_018
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The Blue and Green Infrastructure module aims to bring the student closer to the topic of solving the problems faced by cities in connection with climate change, i.e. periodic droughts on the one hand and torrential rains causing floods and local flooding on the other. During the lectures, the importance of urban ecosystems in the context of water management, a systemic approach to green areas and waters in the city, tools and strategies in planning BZI as well as an overview of technical solutions and examples of good practice will be presented. As part of laboratory classes, students will attempt to assess the existing systems of green areas and waters, select the right solutions depending on spatial and natural conditions, and get acquainted in detail with the technical solutions of BGI elements and design selected elements.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Possession of advanced knowledge in the field of natural sciences and environmental engineering, regarding the importance of green systems in the city and technical solutions used in the design of BGI.	AQ2_W01	4	
02	Having in-depth knowledge of the principles of water management through the prism of natural, economic, administrative, ethical and legal conditions, knowledge of strategic tools and BGI planning instruments	AQ2_W01 AQ2_W03	4 3	
03	Knowledge and understanding of advanced IT techniques supporting research activities in the aspect of water and environmental sciences, being aware of the scope and limitations of their use, using programs to design BZI technical solutions	AQ2_W04 AQ2_W07	3 3	
04	Independent selection of appropriate methods and tools used in planning and technical BZI solutions, selection of appropriate sources of information, ability to use large data resources, ordering and analyzing them, and formulating correct conclusions based on them.	AQ2_U02 AQ2_U04	4 2	
05	Critical analysis of the functioning of the existing solutions of greenery and water systems in the context of rainwater management.	AQ2_U06	3	
06	showing caution and criticism in the assessment of existing and planned BGI elements, and in the event of difficulties,	AQ2_K01	3	

	the ability to organize a team of experts to solve the problem, understanding the importance of water knowledge in solving complex cognitive and practical problems related to water management in the city, in accordance with the principles of sustainable development	AQ2_K02	3
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9. Methods of conducting classes		
Code	Category	Name (description)
b01	Problem-solving methods	Problem-based lecture <i>an analysis of a selected scientific or practical problem accompanied by its assessment and an attempt to provide a solution to the issues presented in the lecture as well as the indication of the consequences of the proposed solution</i>
b07	Problem-solving methods	Activating methods: a case study <i>a comprehensive description of a phenomenon connected with the selected discipline; reflecting the reality, presenting the 'what', 'where' and 'how' of the phenomenon, i.e., all of its key aspects to be discussed in class; used as a reproduction, presentation, discussion or diagnosis of factors that shape the phenomenon or interact with it; an in-depth qualitative analysis and evaluation of a selected phenomenon</i>
b10	Problem-solving methods	SWOT analysis <i>a method of analyzing a phenomenon/action/work of an institution, employed to organize information and solve problems; applied in strategic planning, project implementation or solving a business or organizational problem; a universal tool to be used in the initial stage of a strategic analysis which involves sorting information about a problem into four categories: strengths and weaknesses, opportunities and threats; SWOT analysis makes it possible to determine the factors in favour of a project and its chances for success, as well as eliminating or reducing negative factors and threats to the project at the stage of early diagnosis</i>
e08	Practical methods	Practice-as-research <i>also conducted as fieldwork; an activity aimed at confronting the acquired theory with practice through its practical application; students situate themselves in the reality they observe, study and transform through the prism of the theory; the method of practical classes is dominated by the application of knowledge to solving practical tasks</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	15	exam	01, 02, 03	b01
02	laboratory classes	45	course work	04, 05, 06	b07, b10, e08

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion <i>a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory</i>	No

		<i>phase/element of the verification of the learning outcomes assigned to the course</i>	
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Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		CAD projects and Python programming
Module code		AQ_019
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		Working in AtuoCAD will allow students to learn the basics of 2D and 3D design, create their own technical drawings and use them in the natural sciences. The basics of programming in Python will allow you to understand the basic algorithmic structures and methods in programming. After completing the course, the student will be able to create their own simple programs and continue further programming learning.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Possession of advanced knowledge in the field of natural sciences and environmental engineering, regarding the hydrogeological and geological profiles	AQ2_W01	4	
02	Knowledge and understanding of advanced IT techniques supporting research activities in the aspect of water and environmental sciences, being aware of the scope and limitations of their use, using programs to create own programs, technical projects	AQ2_W04 AQ2_W07	3 3	
03	Independent selection of appropriate methods and tools used in programming selection of appropriate tools in project preparing, ability to use large data resources, ordering and analyzing them	AQ2_U03 AQ2_W07	3 3	
04	Knowledge of the theoretical and practical application of different programming solutions in water sciences	AQ2_U03 AQ2_W07	4 4	
05	Ability to design the project on the basis of achieved knowledge and own program	AQ2_U01 AQ2_W07	4 4	

9.	Methods of conducting classes		
Code	Category	Name (description)	
d01	Programmed learning methods	Working with a computer	

		e.g., Webquest; implementation of educational tasks using electronic and digital devices, computer programs and Internet applications; the academic teacher acts as a consultant; students' work is carried out step by step according to the plan laid down by the person teaching the course and following his instructions, and proceeds towards producing the indicated results within the set deadline
e04	Practical methods	Project scheduling proceeding according to the steps proposed within a specific methodology for the completion of a task; e.g., identifying project objectives, determining the result, identifying strengths, limitations, opportunities and threats (SWOT), establishing a schedule of activities, assessing resources, establishing an implementation plan; the initial diagnosis; the reassessment of assumptions; the process of preparing the practical implementation of a project

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	laboratory classes	60	course work	01, 02, 03, 04, 05	d01, e04

11. The student's work, apart from participation in classes, includes in particular:				
Code	Category	Name (description)		Is it part of the BUNA?
a03	Preparation for classes	Developing practical skills activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)		No
a05	Preparation for classes	Production/preparation of tools, materials or documentation necessary for class participation developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes		No
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content reading through the syllabus and getting acquainted with its content		No
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course		No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes		Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Climate change crisis management
Module code		AQ_008
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The aim of the module is to comprehensively familiarize the student with the existing environmental threats including climate changes, their modelling, monitoring and the characteristic elements of various levels of crisis management, ability to use model research to solve various issues and problems related to water resources and management, use of existing procedures and responsibilities at various levels of management; available materials and information and how to use them; the scope of information and reporting obligations.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Knowledge of environmental hazards in terms of geology, hydrology and meteorology in relation to climate change	AQ2_W01 AQ2_W03	4 4	
02	Knowledge of methods of counteracting environmental threats and mitigating climate change effects as well as techniques and methods of monitoring and modelling existing environmental threats	AQ2_W03	3	
03	Use of knowledge about institutions related to crisis management	AQ2_W04 AQ2_W06	4 4	
04	Knowledge of documents and procedures regulating the duties and scope of activities at various levels of crisis management	AQ2_K05 AQ2_W04	3 3	
05	Knowledge and techniques of anticipating, modelling, counteracting, reducing the effects of potential environmental threats	AQ2_K03 AQ2_U07 AQ2_W04	3 3 3	
06	Ability to perform groundwater pollutant transport models and interpret their results	AQ2_K01 AQ2_K04	2 2	

		AQ2_U10	2
		AQ2_W04	2
07	Planning own and team activities for monitoring existing threats and crisis management in different time perspectives.	AQ2_K01	2
		AQ2_K04	2
		AQ2_U10	2
		AQ2_W04	2

9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
a05	Lecture methods / expository methods	Explanation/clarification <i>explication involving the derivation of a predetermined theorem from other, already known ones, in the number of steps specified by the person teaching the course</i>
b04	Problem-solving methods	Activating method – discussion / debate <i>an exchange of views supported by substantive arguments leading to a clash of different views, a compromise or the identification of common positions; it proceeds according to previously agreed-upon rules regarding the time, manner and turn-taking as well as the principles of civil discourse; a discussion is not a competition but aims at finding the best solutions or presenting different points of view; its varieties include brainstorming, Oxford-style debate, panel discussion, decision tree, conference discussion; a debate is an orderly dispute between supporters and opponents of a viewpoint, usually specialists in the field or pre-selected representatives of a group dealing with a common problem</i>
b07	Problem-solving methods	Activating methods: a case study <i>a comprehensive description of a phenomenon connected with the selected discipline; reflecting the reality, presenting the 'what', 'where' and 'how' of the phenomenon, i.e., all of its key aspects to be discussed in class; used as a reproduction, presentation, discussion or diagnosis of factors that shape the phenomenon or interact with it; an in-depth qualitative analysis and evaluation of a selected phenomenon</i>
d01	Programmed learning methods	Working with a computer <i>e.g., Webquest; implementation of educational tasks using electronic and digital devices, computer programs and Internet applications; the academic teacher acts as a consultant; students' work is carried out step by step according to the plan laid own by the person teaching the course and following his instructions, and proceeds towards producing the indicated results within the set deadline</i>
d02	Programmed learning methods	Working with a programmed textbook <i>working with a textbook containing instructional material covering part of or the entire curriculum of the module as well as a formula for studying the content; includes working with a subject textbook, an atlas, a catalogue, a problem book, etc.</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	15	exam	01, 02, 03	a01, a05
02	laboratory classes	45	course work	04, 05, 06, 07	b04, b07, d01, d02

11. The student's work, apart from participation in classes, includes in particular:				
Code	Category	Name (description)		Is it part of the BUNA?
a01	Preparation for classes	Search for materials and review activities necessary for class participation <i>reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes</i>		Yes
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>		No
a04	Preparation for classes	Consulting materials complementary to those indicated in the syllabus <i>agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation</i>		Yes
a05	Preparation for classes	Production/preparation of tools, materials or documentation necessary for class participation <i>developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes</i>		No
b03	Consulting the curriculum and the organization of classes	Consulting the schedule <i>getting acquainted with the class schedule, possibly in the presence of the year tutor, in order to optimize participation in classes, including those supplementary to the core subjects listed in the pursued study programme</i>		Yes
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>		No
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion <i>a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course</i>		No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>		Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Ecosystem services in aquamatics
Module code		AQ_015
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The module would likely aim to equip students with a comprehensive understanding of the Plant Based Solutions and associated Ecosystem Services in terrestrial environments. The learning outcomes would focus on both theoretical knowledge and practical skills needed to plan adequate management activities to maintain and enhance the Ecosystem Services provided at the urban and the landscape levels.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Acquire general knowledge on Nature Based Solutions (NbS) and Ecosystem Services provided to human beings.	AQ2_W01	4	
02	Identify plant ecophysiological processes exploited for the provision of ecosystem services in urban ecosystems (e.g., mitigation of stormwater runoff and urban heat island effect, air pollution abatement)	AQ2_W01	4	
03	Acquire knowledge of green roofs and green wall technology and their benefits for buildings' water and energy cycles.	AQ2_W02	4	
04	Identify Plant based Solutions (PbS) in Aquamatics in different environmental contexts with case studies (e.g., Root hydraulic redistribution as tool for bio-irrigation in agroforestry contexts, phytoremediation processes, etc.).	AQ2_U01	4	
05	Acquire practical skills to quantify Ecosystem Services in Aquamatics based on PbS with case studies.	AQ2_U03 AQ2_W02	4 4	
06	Based on the acquired knowledge, he/she will be able judge and plan adequate PbS in different (urban and extra-urban) contexts to enhance the provision of Ecosystem Services	AQ2_U08	4	
07	Uses the acquired knowledge in the field of Ecosystem Services based on various sources, including internet sources, in the process of self-education as well as in the process of awareness raising and ecological safety and ecological education in accordance with the principles of ethics.	AQ2_K05 AQ2_U01 AQ2_U10 AQ2_W04	4 4 4 4	

9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
e01	Practical methods	Laboratory exercise / experiment <i>[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	8	exam	01, 02, 03, 04	a01
02	laboratory classes	52	course work	05, 06, 07	d03, e01

11. The student's work, apart from participation in classes, includes in particular:				
Code	Category	Name (description)		Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>		No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>		No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>		Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Environmental monitoring
Module code		AQ_020
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The module "Monitoring of the environment" enables the student to become acquainted with: the regulations and standards in force in Poland with regard to monitoring the state of the natural environment. It deepens knowledge of the role and importance of monitoring the quality of environmental elements for the preservation of human health and safety and for the maintenance of proper functioning of ecosystems. The module has applied significance. The student acquires knowledge and skills on methods of physical and chemical monitoring and biomonitoring of individual elements of the natural environment. It enables you to understand the importance of monitoring for the planning of effective measures by government offices in the short and long term, as well as by obliged industrial plants. The knowledge and skills acquired allow you to understand how environmental monitoring contributes to sustainable development.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Can present and support with arguments his/her position regarding proposals for preventive and remedial actions based on environmental monitoring data	AQ2_U01	4	
		AQ2_W01	4	
02	Can use knowledge to assess the degree of threat to ecosystems and natural environmental resources. Recalls relevant provisions of basic standards (norms and regulations) and legal regulations applicable to air, surface and groundwater, soil, and energy monitoring. Independently and in a team, measures basic physical and chemical parameters used in environmental monitoring environment and interprets the results	AQ2_K01	4	
		AQ2_W01	4	
		AQ2_W04	4	
03	Recognizes the need for prevention and remediation of damage to the natural environment.	AQ2_K02	3	
		AQ2_W03	3	
		AQ2_W04	3	
04	Recognizes phenomena occurring in the environment as a basis for assessing its current state and forecasting further processes. Identifies threats to the natural environment resulting from processes associated with human economic activity, and can assess their scale and impact on the observed changes. Knows the abiotic and biotic factors to be	AQ2_U02	4	
		AQ2_U04	4	
		AQ2_U08	4	

monitored given their significance for human health and the assessment of the state of the natural environment.

9. Methods of conducting classes

Code	Category	Name (description)
a03	Lecture methods / expository methods	Description <i>a description of objects, phenomena, processes or people; it involves specifying the structure and characteristic features of the object, phenomenon, or process being described; it is usually accompanied by a demonstration of the described object or by its models, drawings, tables, charts, etc.; a description may take the form of an explanation, classification, justification or comparison</i>
a04	Lecture methods / expository methods	Lecture-speech <i>a lecture variant; an oral presentation of lecture content which has been prepared in writing; a lecture-speech can be delivered by the person teaching the course or an invited guest</i>
a05	Lecture methods / expository methods	Explanation/clarification <i>explication involving the derivation of a predetermined theorem from other, already known ones, in the number of steps specified by the person teaching the course</i>
b02	Problem-solving methods	Lecture-discussion <i>transmission of content involving interaction with the lecture audience; discussion of lecture-related issues is one of its elements or constitutes its follow-up</i>
b04	Problem-solving methods	Activating method – discussion / debate <i>an exchange of views supported by substantive arguments leading to a clash of different views, a compromise or the identification of common positions; it proceeds according to previously agreed-upon rules regarding the time, manner and turn-taking as well as the principles of civil discourse; a discussion is not a competition but aims at finding the best solutions or presenting different points of view; its varieties include brainstorming, Oxford-style debate, panel discussion, decision tree, conference discussion; a debate is an orderly dispute between supporters and opponents of a viewpoint, usually specialists in the field or pre-selected representatives of a group dealing with a common problem</i>
b07	Problem-solving methods	Activating methods: a case study <i>a comprehensive description of a phenomenon connected with the selected discipline; reflecting the reality, presenting the 'what', 'where' and 'how' of the phenomenon, i.e., all of its key aspects to be discussed in class; used as a reproduction, presentation, discussion or diagnosis of factors that shape the phenomenon or interact with it; an in-depth qualitative analysis and evaluation of a selected phenomenon</i>
c06	Demonstration methods	Demonstration-imitation <i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>
c07	Demonstration methods	Screen presentation <i>a presentation of synthetic image content using computer graphics, e.g., a series of slides or other multimedia forms, usually accompanied by a commentary; typical components of a screen presentation include text organized into bulleted points, charts, images and animations, sometimes sound effects or music; a multimedia illustration of course content presented in the form of a projected image</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
e01	Practical methods	Laboratory exercise / experiment <i>[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the</i>

		assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment
e06	Practical methods	Observation also conducted as fieldwork; a method of watching phenomena, objects or people in a systematic/planned way in order to gain knowledge about them; perceptual separation of elements of a model action as an element of learning through imitation; a complex system of cognition based on sensory experiences
f02	Methods of self-learning	Individual work with a text searching for and acquiring new information using textbooks and other written sources (including their digital versions); searching for texts, selecting fragments for analysis/interpretation, using other texts to solve a problem related to the studied issue

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	discussion classes	15	exam	01, 02	a03, a04, a05, b02, b04, b07, c07
02	laboratory classes	45	course work	03, 04	b04, c06, d03, e01, e06, f02

11. The student's work, apart from participation in classes, includes in particular:				
Code	Category	Name (description)		Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>		No
a04	Preparation for classes	Consulting materials complementary to those indicated in the syllabus <i>agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation</i>		Yes
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content <i>reading through the syllabus and getting acquainted with its content</i>		No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>		No
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion <i>a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course</i>		No

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Environmental statistics and modelling
Module code		AQ_017
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The course in Environmental Statistics and Modelling will provide the student with the skills to go on to a career in this exciting area. Students will learn how models of environmental processes are developed and applied across a range of areas including climate change and the analysis of biodiversity. Students will gain an appreciation of all aspects of environmental modelling ranging from the philosophy of model development, focussing on links to observations and uncertainty analysis, through to more practical aspects such as numerical approximation and algorithm development and testing. The course aims to complete and deepen the knowledge already acquired by students in the field of statistics during the three-year degree course, providing concepts and methodologies useful for environmental sciences, with particular attention to univariate statistics, and mentions of multivariate statistics and geostatistics.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Knowledge on univariate statistics applied to spatial analysis: multiple way ANOVA, ANCOVA and regression, with particular attention to the variable selection methods.	AQ2_W01 AQ2_W07	3 3	
02	Knowledge on the fundamental elements of multivariate statistics and geostatistics.	AQ2_U07 AQ2_W01	2 2	
03	Knowledge on the basic principles of machine learning, with particular attention to neural networks and random forest	AQ2_W01 AQ2_W07	4 4	
04	Ability to apply ANOVA and regression to experimental and spatial data, using statistical software;.	AQ2_U02	3	
05	Ability to correctly choose the most appropriate instruments for their own analysis, based on the possibility and limits of the various approaches available.	AQ2_U02 AQ2_U03	4 4	
06	Ability to carry out simple multivariate or geostatistical analyses	AQ2_U02	2	

9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
b05	Problem-solving methods	Activating method – seminar / proseminar <i>a seminar method; usually an oral presentation of a previously studied/diagnosed problem delivered on a forum; it aims at provoking a discussion concerning the results of research work; a type of conference, course or training session modelled on seminar classes</i>
e01	Practical methods	Laboratory exercise / experiment <i>[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment</i>
e04	Practical methods	Project scheduling <i>proceeding according to the steps proposed within a specific methodology for the completion of a task; e.g., identifying project objectives, determining the result, identifying strengths, limitations, opportunities and threats (SWOT), establishing a schedule of activities, assessing resources, establishing an implementation plan; the initial diagnosis; the reassessment of assumptions; the process of preparing the practical implementation of a project</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	workshop	60	course work	01, 02, 03, 04, 05, 06	a01, b05, e01, e04

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Field practical classes
Module code		AQ_006
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		During field exercises, the student learns the principles and methods of field research carried out as part of the monitoring of surface waters and groundwater. They will acquire basic knowledge in the field of hydrological and hydrogeological mapping and the ability to graphically interpret the results of field work. He will get acquainted with the methods of quantitative and qualitative research of waters. He will know the methods of determining species of plants and animals associated with the aquatic environment.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme		Level of competenc (scale 1-5)
01	Having knowledge about the surface water environment.	AQ2_U06		2
		AQ2_W01		3
02	Having knowledge about the groundwater environment.	AQ2_K01		2
		AQ2_U04		2
		AQ2_W01		3
03	Having nowledge of hydrobiology.	AQ2_K02		2
		AQ2_U11		2
		AQ2_W01		3
04	Knowledge of the basics of practical application of research methods in the field of water sciences	AQ2_K02		3
		AQ2_K05		2
		AQ2_U02		3
		AQ2_W02		3
		AQ2_W04		3

05	Demonstration of the ability to critically analyze the application of selected research methods in water sciences	AQ2_K01 AQ2_U06 AQ2_W02	2 3 2
06	Ability to plan and organize independent and team work in field research.	AQ2_K04 AQ2_U10	3 4

9. Methods of conducting classes		
Code	Category	Name (description)
e06	Practical methods	Observation <i>also conducted as fieldwork; a method of watching phenomena, objects or people in a systematic/planned way in order to gain knowledge about them; perceptual separation of elements of a model action as an element of learning through imitation; a complex system of cognition based on sensory experiences</i>
e08	Practical methods	Practice-as-research <i>also conducted as fieldwork; an activity aimed at confronting the acquired theory with practice through its practical application; students situate themselves in the reality they observe, study and transform through the prism of the theory; the method of practical classes is dominated by the application of knowledge to solving practical tasks</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	field practice	60	course work	01, 02, 03, 04, 05, 06	e06, e08

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a01	Preparation for classes	Search for materials and review activities necessary for class participation <i>reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes</i>	Yes
a03	Preparation for classes	Developing practical skills <i>activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)</i>	No
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion <i>a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course</i>	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Final work of master studies
Module code		AQ_013
Number of the ECTS credits		24
Language of instruction		English
Purpose and description of the content of education		<p>The student acquires the skills to prepare and implement an individual research project. Based on the experience gained during their studies, among others as a result of the implementation of the Project1 module, students prepare an individual master's project. The project manager is a student who prepares a project description/assumptions, creates a project team, prepares a cost estimate and a schedule for project implementation. The result of the project is a master's thesis. Students engage other students with the required competences to carry out technical activities in projects. Implementation of research projects - learning project management, learning teamwork/management through practice. The activities proposed by the student make it possible to solve the problem posed in the master's thesis and, on this basis, to obtain the results presented in the master's thesis, the project is admitted to defend the master's thesis. The leader/promoter takes on the role of mentor/advisor, the principals act as the management of the project controlling and evaluating the progress of ongoing tasks.</p> <p>Implementation of projects Research - learning project management, learning teamwork/management through practice.</p>
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Ability to formulate a research problem and suggest a way to solve it.	AQ2_K01	4	
		AQ2_U01	4	
		AQ2_W01	4	
02	Ability to plan research and conduct it in accordance with the principles of project management	AQ2_U01	2	
03	Ability to cooperate in a research team in the implementation of planned tasks	AQ2_K04	3	
		AQ2_U01	3	
		AQ2_U10	3	
04	Ability to independently use the research tools learned.	AQ2_K02	3	

		AQ2_U01	3
		AQ2_W01	3
		AQ2_W07	3
05	Participation in the development of the results obtained tests the ability to draw conclusions based on the results obtained and in accordance with current knowledge describe the results obtained, arguing the conclusions in accordance with modern knowledge	AQ2_K01	3
		AQ2_U01	3
		AQ2_U02	3
		AQ2_U03	3
		AQ2_U04	4
		AQ2_U08	3
		AQ2_U09	4
06	Ability to think and act in an entrepreneurial way	AQ2_K04	3
		AQ2_W05	3
07	Understanding the need for lifelong learning, constant updating of knowledge in the field and improving professional and personal competences.	AQ2_U11	4

9. Methods of conducting classes		
Code	Category	Name (description)
b10	Problem-solving methods	SWOT analysis <i>a method of analyzing a phenomenon/action/work of an institution, employed to organize information and solve problems; applied in strategic planning, project implementation or solving a business or organizational problem; a universal tool to be used in the initial stage of a strategic analysis which involves sorting information about a problem into four categories: strengths and weaknesses, opportunities and threats; SWOT analysis makes it possible to determine the factors in favour of a project and its chances for success, as well as eliminating or reducing negative factors and threats to the project at the stage of early diagnosis</i>
e04	Practical methods	Project scheduling <i>proceeding according to the steps proposed within a specific methodology for the completion of a task; e.g., identifying project objectives, determining the result, identifying strengths, limitations, opportunities and threats (SWOT), establishing a schedule of activities, assessing resources, establishing an implementation plan; the initial diagnosis; the reassessment of assumptions; the process of preparing the practical implementation of a project</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	laboratory classes	120	course work	01, 02, 03, 04, 05, 06, 07	b10, e04

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No

a04	Preparation for classes	Consulting materials complementary to those indicated in the syllabus <i>agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation</i>	Yes
a05	Preparation for classes	Production/preparation of tools, materials or documentation necessary for class participation <i>developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes</i>	No
c01	Preparation for verification of learning outcomes	Determining the stages of task implementation contributing to the verification of learning outcomes <i>devising a task implementation strategy embracing the division of content, the range of activities, implementation time and/or the method(s) of obtaining the necessary materials and tools, etc.</i>	No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Fish resources, fishing and aquaculture
Module code		AQ_010
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The subject is designed to form students a systematic approach to fish stocks, the proper application of various fishing technologies, the importance and possibilities of aquaculture. Students will be able to assess the fish resources of water bodies, choose the proper fishing method, equipment and fishing systems, evaluate the habits of the fish caught and the peculiarities of fishing in different conditions, will be able to predict the necessary aquaculture system and elements, the biotechnology of farmed fish. Students will be able to work practically with closed aquaculture systems, use modern fishing tools in various water bodies, conduct sports fishing competitions or organize recreational fishing.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme		Level of competenc (scale 1-5)
01	Able to assess fish stocks in a water body.	AQ2_W01	3	
		AQ2_W02	3	
02	Able to describe in detail the importance of fish stocks, the principles of their protection and rational use.	AQ2_W04	3	
		AQ2_W06	3	
03	Able to explain the specifics and problems of various types of fishing.	AQ2_U01	3	
		AQ2_U02	3	
		AQ2_U04	4	
04	Able to identify the most commonly caught fish, describe the characteristics of their life and behavior.	AQ2_U01	3	
		AQ2_U03	3	
		AQ2_U04	4	
05	Able to describe fishing methods, conditions of their application and equipment, is able to apply them in practice.	AQ2_U05	3	
		AQ2_U07	3	

06	Able to describe fishing methods, conditions of their application, and equipment, can apply them in practice.	AQ2_U04 AQ2_U06	3 4
07	Able to explain the differences between types of aquaculture and describe the characteristics of varieties and/or species of aquatic animals and plants grown in aquaculture systems.	AQ2_U04 AQ2_U06	3 4
08	Able to describe the devices used for growing aquatic animals and plants in aquaculture systems, their purpose and needs.	AQ2_U06 AQ2_U08	3 3
09	Explains the methods and tools used for breeding and cultivating aquatic animals and plants, their advantages and disadvantages.	AQ2_K01 AQ2_K03	3 3

9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
c06	Demonstration methods	Demonstration-imitation <i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
e01	Practical methods	Laboratory exercise / experiment <i>[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	30	exam	01, 02, 03, 04, 05	a01
02	laboratory classes	30	course work	06, 07, 08, 09	c06, d03, e01

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
a03	Preparation for classes	Developing practical skills <i>activities involving the repetition, refinement and consolidation of practical skills, including those</i>	No

		<i>developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)</i>	
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		General academic module (Humanities)
Module code		OOD_2024_SS_MOH
Number of the ECTS credits		3
Language of instruction		
Purpose and description of the content of education		The humanistic general academic module allows the student to get acquainted with selected areas of the subject-related specificity of humanities. The student has a chance to compare different methodological and interpretative approaches, and gains knowledge about the benefits of adopting a humanistic perspective of the view of reality. The student learns to implement recognized paradigms of humanistic thinking into their scientific activity, creatively solving the problems posed during the classes. Based on specific cases, the student trains the ability to integrate views appropriate for humanities with the points of view that belong to the fields of science and scientific disciplines appropriate for the studied programme. During the meetings, the student identifies manners of participation in present and future cultural formations, recognizing the paths of individual participation in the life of adequate human communities in the presented and experienced activities.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
HMO1_1	The student knows selected issues related to the subject-related specificity of the humanities, understands their nature, place and importance in the system of sciences, as well as their connections with fields of science and scientific disciplines specific to the studied programme, allowing for the integration of perspectives appropriate for different scientific disciplines..	OOD.2024_U01 OOD.2024_W01	3 3	
HMO1_2	The student is able to select, interpret and evaluate knowledge from selected disciplines in the field of humanities and integrate and apply it in scientific activity and professional practice in a manner that allows for original and creative solutions to problems that they experience as participants in cultural life.	OOD.2024_U01 OOD.2024_W01	3 3	
HMO1_3	The student is able to creatively undertake, analyse and become involved in current sociocultural discourses, using knowledge of the studied problems of contemporary humanities and acquired communication skills as well as subject-related argumentation that considers various scientific approaches and types of scientific reflection.	OOD.2024_U01 OOD.2024_W01	3 3	
HMO1_4	The student, who is a participant in cultural life in its various manifestations, shows the need for continuous learning and improvement of those dispositions that allow to appreciate humanistic reflection and integrate it with issues and experiences resulting from choosing one's own path of scientific and professional activities and related to individual	OOD.2024_KS01 OOD.2024_U01 OOD.2024_W01	2 2 2	

cultural activity.

9. Methods of conducting classes

Code	Category	Name (description)
a03	Lecture methods / expository methods	Description <i>a description of objects, phenomena, processes or people; it involves specifying the structure and characteristic features of the object, phenomenon, or process being described; it is usually accompanied by a demonstration of the described object or by its models, drawings, tables, charts, etc.; a description may take the form of an explanation, classification, justification or comparison</i>
a05	Lecture methods / expository methods	Explanation/clarification <i>explication involving the derivation of a predetermined theorem from other, already known ones, in the number of steps specified by the person teaching the course</i>
b04	Problem-solving methods	Activating method – discussion / debate <i>an exchange of views supported by substantive arguments leading to a clash of different views, a compromise or the identification of common positions; it proceeds according to previously agreed-upon rules regarding the time, manner and turn-taking as well as the principles of civil discourse; a discussion is not a competition but aims at finding the best solutions or presenting different points of view; its varieties include brainstorming, Oxford-style debate, panel discussion, decision tree, conference discussion; a debate is an orderly dispute between supporters and opponents of a viewpoint, usually specialists in the field or pre-selected representatives of a group dealing with a common problem</i>
c07	Demonstration methods	Screen presentation <i>a presentation of synthetic image content using computer graphics, e.g., a series of slides or other multimedia forms, usually accompanied by a commentary; typical components of a screen presentation include text organized into bulleted points, charts, images and animations, sometimes sound effects or music; a multimedia illustration of course content presented in the form of a projected image</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
f01	Methods of self-learning	Self-education <i>a method which involves independent acquisition of knowledge, skills and social competences, extending their scope and quality; complementary to the learning process taking place in class; taking on the task of developing and adjusting qualifications on one's own; self-study</i>
f02	Methods of self-learning	Individual work with a text <i>searching for and acquiring new information using textbooks and other written sources (including their digital versions); searching for texts, selecting fragments for analysis/interpretation, using other texts to solve a problem related to the studied issue</i>

10. Forms of teaching

Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	depending on the choice	30	course work	HMO1_1, HMO1_2, HMO1_3, HMO1_4	a03, a05, b04, c07, d03, f01, f02

11. The student's work, apart from participation in classes, includes in particular:

Code	Category	Name (description)	Is it part of the BUNA?
a01	Preparation for classes	Search for materials and review activities necessary for class participation	No

		<i>reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes</i>	
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
a04	Preparation for classes	Consulting materials complementary to those indicated in the syllabus <i>agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation</i>	Yes
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content <i>reading through the syllabus and getting acquainted with its content</i>	Yes
c01	Preparation for verification of learning outcomes	Determining the stages of task implementation contributing to the verification of learning outcomes <i>devising a task implementation strategy embracing the division of content, the range of activities, implementation time and/or the method(s) of obtaining the necessary materials and tools, etc.</i>	Yes
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
e01	Activities complementary to the classes	Undertaking, on one's own initiative and individually, activities aimed at expanding the scope or depth of the teaching content, also beyond the walls of the University <i>a set of activities undertaken independently and on the student's own initiative, aimed at expanding the depth and scope of knowledge and skills, their revision and repetition, retention or verification, also activities carried outside the university, e.g., in a culture promoting or educational institution, a laboratory, in the open air, etc.; also self-education</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		General academic module (Social Sciences)
Module code		OOD_2024_SS_MOS
Number of the ECTS credits		3
Language of instruction		
Purpose and description of the content of education		The social general academic module allows the student to get acquainted with selected areas of the subject-related specificity of social sciences. The student has a chance to compare different methodological and interpretative approaches, gains knowledge about the benefits of adopting a perspective of reality appropriate for social sciences. Based on specific cases, the student trains the ability to integrate views appropriate for social sciences with points of view that belong to fields of science and scientific disciplines appropriate for the studied programme.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
SMO1_1	The student knows selected issues related to the subject-related specificity of social sciences, understands their nature, place and importance in the system of sciences, as well as their connections with fields of science and scientific disciplines specific to the studied programme, allowing for the integration of perspectives appropriate for different scientific disciplines.	OOD.2024_U01 OOD.2024_W01	3 3	
SMO1_2	The student is able to select, interpret and evaluate knowledge from selected disciplines in the field of social sciences and integrate and apply it in scientific activity and professional practice in a manner that allows for original and creative solutions to problems that they experience as participants in social life.	OOD.2024_U01 OOD.2024_W01	3 3	
SMO1_3	The student is able to creatively undertake, analyse and become involved in current sociocultural discourses, using knowledge of the studied content, acquired communication skills and subject-related argumentation taking into account various scientific approaches and types of scientific reflection.	OOD.2024_U01 OOD.2024_W01	3 3	
SMO1_4	The student, who is a participant in social life in its various manifestations, shows the need for continuous learning and improvement of those dispositions that result from choosing their own path of scientific and professional activities and related to individual social activity.	OOD.2024_KS01 OOD.2024_U01 OOD.2024_W01	2 2 2	

9. Methods of conducting classes		
Code	Category	Name (description)
a03	Lecture methods / expository methods	Description <i>a description of objects, phenomena, processes or people; it involves specifying the structure and characteristic features of the object, phenomenon, or process being described; it is usually accompanied by a demonstration of the described object or by its models, drawings, tables, charts, etc.; a description may take the form of an explanation, classification, justification or comparison</i>
a05	Lecture methods / expository methods	Explanation/clarification <i>explication involving the derivation of a predetermined theorem from other, already known ones, in the number of steps specified by the person teaching the course</i>
b04	Problem-solving methods	Activating method – discussion / debate <i>an exchange of views supported by substantive arguments leading to a clash of different views, a compromise or the identification of common positions; it proceeds according to previously agreed-upon rules regarding the time, manner and turn-taking as well as the principles of civil discourse; a discussion is not a competition but aims at finding the best solutions or presenting different points of view; its varieties include brainstorming, Oxford-style debate, panel discussion, decision tree, conference discussion; a debate is an orderly dispute between supporters and opponents of a viewpoint, usually specialists in the field or pre-selected representatives of a group dealing with a common problem</i>
c07	Demonstration methods	Screen presentation <i>a presentation of synthetic image content using computer graphics, e.g., a series of slides or other multimedia forms, usually accompanied by a commentary; typical components of a screen presentation include text organized into bulleted points, charts, images and animations, sometimes sound effects or music; a multimedia illustration of course content presented in the form of a projected image</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
f01	Methods of self-learning	Self-education <i>a method which involves independent acquisition of knowledge, skills and social competences, extending their scope and quality; complementary to the learning process taking place in class; taking on the task of developing and adjusting qualifications on one's own; self-study</i>
f02	Methods of self-learning	Individual work with a text <i>searching for and acquiring new information using textbooks and other written sources (including their digital versions); searching for texts, selecting fragments for analysis/interpretation, using other texts to solve a problem related to the studied issue</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	depending on the choice	30	course work	SMO1_1, SMO1_2, SMO1_3, SMO1_4	a03, a05, b04, c07, d03, f01, f02

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a01	Preparation for classes	Search for materials and review activities necessary for class participation <i>reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes</i>	No

a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
a04	Preparation for classes	Consulting materials complementary to those indicated in the syllabus <i>agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation</i>	Yes
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content <i>reading through the syllabus and getting acquainted with its content</i>	Yes
c01	Preparation for verification of learning outcomes	Determining the stages of task implementation contributing to the verification of learning outcomes <i>devising a task implementation strategy embracing the division of content, the range of activities, implementation time and/or the method(s) of obtaining the necessary materials and tools, etc.</i>	Yes
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
e01	Activities complementary to the classes	Undertaking, on one's own initiative and individually, activities aimed at expanding the scope or depth of the teaching content, also beyond the walls of the University <i>a set of activities undertaken independently and on the student's own initiative, aimed at expanding the depth and scope of knowledge and skills, their revision and repetition, retention or verification, also activities carried outside the university, e.g., in a culture promoting or educational institution, a laboratory, in the open air, etc.; also self-education</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		GIS in aquamatics
Module code		AQ_002
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		During the course, the student acquires the following skills: basics of creating vector data models, data visualization; transformation of data and coordinate systems; raster image registration; work in selected GIS software packages and the use of advanced GIS research techniques and tools to describe phenomena and data analysis.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Knowledge of basic recording formats and types of spatial data.	AQ2_W07	4	
02	Understanding the specificity and structure of vector and raster spatial data.	AQ2_U02	4	
		AQ2_W07	4	
03	Ability to open and edit spatial data formats and types in various GIS programs.	AQ2_U03	4	
		AQ2_W07	4	
04	Knowledge of the theoretical and practical application of vector data geoprocessing. Ability to perform geometric and topological operations on vector data.	AQ2_U03	4	
		AQ2_W07	4	
05	Can design the structure of a spatial database, adapting it to the specifics of the research conducted and the informational scope of the data collected.	AQ2_U01	4	
		AQ2_W07	4	

9.	Methods of conducting classes		
Code	Category	Name (description)	
d01	Programmed learning methods	Working with a computer e.g., Webquest; implementation of educational tasks using electronic and digital devices, computer programs and Internet applications; the academic teacher acts as a consultant; students' work is carried out step by step according to the plan laid	

		<i>own by the person teaching the course and following his instructions, and proceeds towards producing the indicated results within the set deadline</i>
d02	Programmed learning methods	Working with a programmed textbook <i>working with a textbook containing instructional material covering part of or the entire curriculum of the module as well as a formula for studying the content; includes working with a subject textbook, an atlas, a catalogue, a problem book, etc.</i>
e04	Practical methods	Project scheduling <i>proceeding according to the steps proposed within a specific methodology for the completion of a task; e.g., identifying project objectives, determining the result, identifying strengths, limitations, opportunities and threats (SWOT), establishing a schedule of activities, assessing resources, establishing an implementation plan; the initial diagnosis; the reassessment of assumptions; the process of preparing the practical implementation of a project</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	laboratory classes	60	course work	01, 02, 03, 04, 05	d01, d02, e04

11. The student's work, apart from participation in classes, includes in particular:				
Code	Category	Name (description)		Is it part of the BUNA?
a03	Preparation for classes	Developing practical skills <i>activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)</i>		No
a05	Preparation for classes	Production/preparation of tools, materials or documentation necessary for class participation <i>developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes</i>		No
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content <i>reading through the syllabus and getting acquainted with its content</i>		Yes
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion <i>a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course</i>		No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>		Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Hydraulic structures and hydropower
Module code		AQ_012
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The course aim - to understand purpose of different hydraulic structures and their sustainable applications. To evaluate hydropower resources, possibilities of their use, using software to prepare feasibility studies, technical projects for practical use of hydropower. To provide knowledge about hydraulic structures and hydropower, its importance, development problems, integration into the environment and perspectives, research and develop skills in the design, management, and use of computer programs.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	To get acquainted with subject resources, literature, research and trends.	AQ2_W01	3	
		AQ2_W03	4	
		AQ2_W04	5	
02	Master the significance of hydraulic structures in anthropological and natural environment	AQ2_U01	3	
		AQ2_U02	4	
		AQ2_U03	4	
03	To master the basics of HS and HP theory, will be able to use calculation methods in practice	AQ2_U02	4	
		AQ2_U06	3	
		AQ2_W07	5	
04	Gain knowledge about non-traditional HSs and HPs, their construction and purpose.	AQ2_W02	3	
		AQ2_W07	4	
05	Able to use hydropower calculation methods practically, software required for technical projects and feasibility studies	AQ2_K01	4	
		AQ2_K02	4	

		AQ2_U07	5
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9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
c06	Demonstration methods	Demonstration-imitation <i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	30	exam	01, 04	a01
02	seminar	15	course work	05	c06, d03
03	laboratory classes	15	course work	02, 03	c06, d03

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
a03	Preparation for classes	Developing practical skills <i>activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)</i>	No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Hydrogeology and hydrology
Module code		AQ_004
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The learning outcomes in the field of hydrology realized during lectures and laboratory classes are identified with the knowledge allowing for the correct analysis of cause-and-effect relationships in hydrology and hydrogeology. Of particular importance in education in the field of hydrology is recognizing and correctly explaining the mutual relationships and connections of surface and subsurface waters with groundwater and other components of the environment. Both lectures and laboratory classes are aimed at acquiring knowledge, skills and social competences identified with the knowledge of the hydrological and hydrogeological research methodology.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme		Level of competenc (scale 1-5)
01	Knowledge of basic research methods in hydrology and hydrogeology.	AQ2_K03		3
		AQ2_U03		4
		AQ2_W01		4
02	Understanding concepts related to groundwater, surface waters, wetlands, glaciers	AQ2_U06		3
		AQ2_W01		3
03	Knowledge of the basic processes forming the chemical composition of water. Understanding of hydrological and hydrological phenomena in local, regional and global aspects.	AQ2_K03		3
		AQ2_W01		3
		AQ2_W03		3
04	Ability to assess groundwater and surface water resources.	AQ2_U01		3
		AQ2_U06		3
		AQ2_W01		2
		AQ2_W02		2

05	Having knowledge and skills in the preparation of hydrological and hydrogeological maps and ability to perform and interpret hydrological and hydrogeological studies.	AQ2_K01 AQ2_U06 AQ2_W03 AQ2_W04	3 3 3 3
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9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
c06	Demonstration methods	Demonstration-imitation <i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>
e01	Practical methods	Laboratory exercise / experiment <i>[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment</i>
e06	Practical methods	Observation <i>also conducted as fieldwork; a method of watching phenomena, objects or people in a systematic/planned way in order to gain knowledge about them; perceptual separation of elements of a model action as an element of learning through imitation; a complex system of cognition based on sensory experiences</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	15	exam	02, 03, 04	a01, c06
02	laboratory classes	45	course work	01, 05	e01, e06

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
c01	Preparation for verification of learning outcomes	Determining the stages of task implementation contributing to the verification of learning outcomes <i>devising a task implementation strategy embracing the division of content, the range of activities, implementation time and/or the method(s) of obtaining the necessary materials and tools, etc.</i>	Yes
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion	No

		<i>a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course</i>	
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Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Innovative technological solutions in aquaculture
Module code		AQ_022
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The course objective is to form capabilities to create and use innovative technological solutions in aquaculture. Students will be able to combine technological solutions from various areas and create optimal conditions for the incubation and growth of different water cultures.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	To be able to define aquaculture systems, the purpose of its elements, the need for innovative technological solution	AQ2_W01	4	
		AQ2_W03	3	
		AQ2_W04	3	
02	Be able to create and/or apply innovative technological solutions in closed circulation systems	AQ2_U01	4	
		AQ2_U02	3	
		AQ2_U03	3	
03	Be able to develop and/or apply new biotechnologies for the cultivation of fish, crustaceans and/or other aquatic organisms	AQ2_U02	4	
		AQ2_U06	3	
		AQ2_W07	3	

9.	Methods of conducting classes		
	Code	Category	Name (description)
	a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
	c06	Demonstration methods	Demonstration-imitation

		<i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	35	exam	01	a01
02	laboratory classes	25	course work	02, 03	c06, d03

11. The student's work, apart from participation in classes, includes in particular:				
Code	Category	Name (description)		Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>		No
a03	Preparation for classes	Developing practical skills <i>activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)</i>		No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>		No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>		Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Remote sensing in aquamatics
Module code		AQ_014
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The course is designed for students of the study programme Aquamatics. In this course, students will learn about remote sensing methods, their use cases in water environments, differences between various sensors and data structures. Topics of the course will cover practical examples of acquiring data from satellite data hubs, using GIS modelling and spaceborne DEM to delineate the river network and its flow contributing (catchment) area. Students will learn to use multispectral satellite imagery to analyze water bodies and C-SAR for flood monitoring. Field study is foreseen where students will conduct research missions using UAVs.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme		Level of competenc (scale 1-5)
01	Know how to explore freely available satellite data. Knowledge of basic recording formats and spatial data types.	AQ2_W01	3	
		AQ2_W03	3	
02	Knowledge of different satellite data sets and their intended use.	AQ2_W04	3	
		AQ2_W06	3	
03	Ability to use digital elevation model data to delineate the river network and catchment areas.	AQ2_U01	3	
		AQ2_U02	3	
		AQ2_U03	3	
04	Ability to use satellite images to analyze water bodies.	AQ2_U01	3	
		AQ2_U02	3	
		AQ2_U06	3	
05	Knowledge of how to use radar data for flood monitoring.	AQ2_W02	3	
		AQ2_W07	3	

06	Ability to conduct research missions using UAVs, collect, process and analyze data.	AQ2_U05 AQ2_U07	3 3
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9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
c06	Demonstration methods	Demonstration-imitation <i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
e01	Practical methods	Laboratory exercise / experiment <i>[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	30	exam	01, 02, 05	a01
02	laboratory classes	15	course work	03, 04	c06, d03, e01
03	seminar	15	course work	06	c06, d03, e01

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
a03	Preparation for classes	Developing practical skills <i>activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)</i>	No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
d01	Consulting the results of the verification of	Analysis of the corrective feedback provided by the academic teacher on the results of the	Yes

	learning outcomes	verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	
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Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Research management and methods
Module code		AQ_001
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The student acquires the skills to plan and implement an individual research project. Students improve themselves in developing topics related to their own research project, based on a critical analysis of the latest literature. The task of the module is to teach the students the principles of research work in accordance with the principles of project management. During the classes, students prepares an outline of the project, including a financial and substantive schedule, taking into account the design of project milestones and the risk analysis of task implementation. Students learn to control the project following the schedule. Also, students get familiar with data analysis, starting from understanding the structure of data and data arrangement, through their processing, quality analysis, graphical presentation, to statistical analysis. Students will learn about IT tools for managing data sets to acquire the ability to use adequate software.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Describing the obtained results, using adequate techniques of presenting and writing scientific papers, arguing the conclusions in accordance with modern knowledge	AQ2_U01	4	
		AQ2_U02	4	
		AQ2_U03	4	
		AQ2_U04	4	
		AQ2_U08	4	
		AQ2_W01	4	
02	Getting the knowledge of potential sources of funding for research, R&D and implementation projects	AQ2_W05	3	
03	Ability to plan a research and development project based on basic tools supporting project management	AQ2_K04	3	
		AQ2_U06	3	
		AQ2_U08	3	
		AQ2_U10	3	

		AQ2_W05	3
04	Ability to select and apply research techniques to the needs of the project.	AQ2_K04	4
		AQ2_U02	4
		AQ2_U03	4
05	Has the ability to recognize data structure, and storage, select data analysis tools in depth, and skillfully assess data quality.	AQ2_K04	4
		AQ2_U02	4
		AQ2_U03	4
		AQ2_U05	3
		AQ2_W01	4
		AQ2_W07	4

9. Methods of conducting classes		
Code	Category	Name (description)
b05	Problem-solving methods	Activating method – seminar / proseminar <i>a seminar method; usually an oral presentation of a previously studied/diagnosed problem delivered on a forum; it aims at provoking a discussion concerning the results of research work; a type of conference, course or training session modelled on seminar classes</i>
d01	Programmed learning methods	Working with a computer <i>e.g., Webquest; implementation of educational tasks using electronic and digital devices, computer programs and Internet applications; the academic teacher acts as a consultant; students' work is carried out step by step according to the plan laid own by the person teaching the course and following his instructions, and proceeds towards producing the indicated results within the set deadline</i>
d02	Programmed learning methods	Working with a programmed textbook <i>working with a textbook containing instructional material covering part of or the entire curriculum of the module as well as a formula for studying the content; includes working with a subject textbook, an atlas, a catalogue, a problem book, etc.</i>
e04	Practical methods	Project scheduling <i>proceeding according to the steps proposed within a specific methodology for the completion of a task; e.g., identifying project objectives, determining the result, identifying strengths, limitations, opportunities and threats (SWOT), establishing a schedule of activities, assessing resources, establishing an implementation plan; the initial diagnosis; the reassessment of assumptions; the process of preparing the practical implementation of a project</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	seminar	30	course work	01, 03, 04	b05
02	laboratory classes	30	course work	02, 05	d01, d02, e04

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a01	Preparation for classes	Search for materials and review activities necessary for class participation	Yes

		<i>reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes</i>	
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
a05	Preparation for classes	Production/preparation of tools, materials or documentation necessary for class participation <i>developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes</i>	Yes
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content <i>reading through the syllabus and getting acquainted with its content</i>	Yes
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Research work 1
Module code		AQ_005
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Ability to formulate a research problem and suggest a way to solve it.	AQ2_K01	4	
		AQ2_K02	3	
		AQ2_U01	4	
		AQ2_U09	4	
		AQ2_W01	4	
02	Ability to plan research and conduct it in accordance with the principles of project management	AQ2_U01	3	
03	Ability to cooperate in a research team in the implementation of planned tasks	AQ2_K04	3	
		AQ2_U01	3	
		AQ2_W02	3	
04	Ability to independently use the research tools learned	AQ2_K02	3	
		AQ2_U01	4	
		AQ2_W07	3	

9. Methods of conducting classes		
Code	Category	Name (description)
b05	Problem-solving methods	Activating method – seminar / proseminar <i>a seminar method; usually an oral presentation of a previously studied/diagnosed problem delivered on a forum; it aims at provoking a discussion concerning the results of research work; a type of conference, course or training session modelled on seminar classes</i>
b10	Problem-solving methods	SWOT analysis <i>a method of analyzing a phenomenon/action/work of an institution, employed to organize information and solve problems; applied in strategic planning, project implementation or solving a business or organizational problem; a universal tool to be used in the initial stage of a strategic analysis which involves sorting information about a problem into four categories: strengths and weaknesses, opportunities and threats; SWOT analysis makes it possible to determine the factors in favour of a project and its chances for success, as well as eliminating or reducing negative factors and threats to the project at the stage of early diagnosis</i>
e04	Practical methods	Project scheduling <i>proceeding according to the steps proposed within a specific methodology for the completion of a task; e.g., identifying project objectives, determining the result, identifying strengths, limitations, opportunities and threats (SWOT), establishing a schedule of activities, assessing resources, establishing an implementation plan; the initial diagnosis; the reassessment of assumptions; the process of preparing the practical implementation of a project</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	laboratory classes	60	course work	01, 02, 03, 04	b05, b10, e04

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a01	Preparation for classes	Search for materials and review activities necessary for class participation <i>reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes</i>	Yes
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
a04	Preparation for classes	Consulting materials complementary to those indicated in the syllabus <i>agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation</i>	Yes
a05	Preparation for classes	Production/preparation of tools, materials or documentation necessary for class participation <i>developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes</i>	No
b03	Consulting the curriculum and the organization of classes	Consulting the schedule <i>getting acquainted with the class schedule, possibly in the presence of the year tutor, in order to optimize participation in classes, including those supplementary to the core subjects listed in the pursued study programme</i>	Yes
c01	Preparation for verification of learning outcomes	Determining the stages of task implementation contributing to the verification of learning	No

		outcomes <i>devising a task implementation strategy embracing the division of content, the range of activities, implementation time and/or the method(s) of obtaining the necessary materials and tools, etc.</i>	
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Research work 2
Module code		AQ_009
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The students acquires the skills to plan and implement an individual research project and to prepare an engineering scientific thesis. They learn to plan and implement the next stages of preparing a scientific study: obtaining data, literature research, effective selection of data and critical approach for the literature, proper use of information (including the principle of anti-plagiarism), formulating the purpose of a scientific study. Depending on the specialization pursued by the student and the subject of the engineering thesis: learns the principles of selecting appropriate methods to solve a specific problem or making a compilation based on existing literature.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme		Level of competenc (scale 1-5)
01	Ability to formulate a research problem and suggest a way to solve it.	AQ2_K01	4	
		AQ2_U01	4	
		AQ2_W01	4	
02	Ability to plan research and conduct it in accordance with the principles of project management	AQ2_K04	2	
		AQ2_U01	2	
03	Ability to create a research team to carry out planned tasks.	AQ2_K04	3	
		AQ2_U10	3	
04	Ability to independently use the research tools learned.	AQ2_K02	2	
		AQ2_W01	2	
		AQ2_W07	2	
05	Ability to develop the obtained research results, critically evaluate the obtained research results and formulate conclusions in accordance with the current knowledge.	AQ2_K01	3	
		AQ2_K02	3	

		AQ2_U01	3
		AQ2_U02	3
		AQ2_U03	3
		AQ2_U04	3
06	Ability to prepare a well-documented study in the field of water sciences and to make an oral presentation of specific issues in the field of water sciences in both Polish and English	AQ2_K01	3
		AQ2_U01	3
		AQ2_U02	3
		AQ2_U03	3
		AQ2_U04	3
		AQ2_U08	3
		AQ2_U09	3

9. Methods of conducting classes		
Code	Category	Name (description)
b05	Problem-solving methods	Activating method – seminar / proseminar <i>a seminar method; usually an oral presentation of a previously studied/diagnosed problem delivered on a forum; it aims at provoking a discussion concerning the results of research work; a type of conference, course or training session modelled on seminar classes</i>
b10	Problem-solving methods	SWOT analysis <i>a method of analyzing a phenomenon/action/work of an institution, employed to organize information and solve problems; applied in strategic planning, project implementation or solving a business or organizational problem; a universal tool to be used in the initial stage of a strategic analysis which involves sorting information about a problem into four categories: strengths and weaknesses, opportunities and threats; SWOT analysis makes it possible to determine the factors in favour of a project and its chances for success, as well as eliminating or reducing negative factors and threats to the project at the stage of early diagnosis</i>
e04	Practical methods	Project scheduling <i>proceeding according to the steps proposed within a specific methodology for the completion of a task; e.g., identifying project objectives, determining the result, identifying strengths, limitations, opportunities and threats (SWOT), establishing a schedule of activities, assessing resources, establishing an implementation plan; the initial diagnosis; the reassessment of assumptions; the process of preparing the practical implementation of a project</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	laboratory classes	60	course work	01, 02, 03, 04, 05, 06	b05, b10, e04

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a01	Preparation for classes	Search for materials and review activities necessary for class participation <i>reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes</i>	No

a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
a04	Preparation for classes	Consulting materials complementary to those indicated in the syllabus <i>agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation</i>	No
a05	Preparation for classes	Production/preparation of tools, materials or documentation necessary for class participation <i>developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes</i>	No
b03	Consulting the curriculum and the organization of classes	Consulting the schedule <i>getting acquainted with the class schedule, possibly in the presence of the year tutor, in order to optimize participation in classes, including those supplementary to the core subjects listed in the pursued study programme</i>	Yes
c01	Preparation for verification of learning outcomes	Determining the stages of task implementation contributing to the verification of learning outcomes <i>devising a task implementation strategy embracing the division of content, the range of activities, implementation time and/or the method(s) of obtaining the necessary materials and tools, etc.</i>	No
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion <i>a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course</i>	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes
d02	Consulting the results of the verification of learning outcomes	Development of a corrective action plan as well as supplementary/corrective tasks <i>reviewing and selecting tasks and activities enabling the elimination of errors indicated by the academic teacher, their verification or correction resulting in completing the task with at least the minimum passing grade</i>	Yes
d03	Consulting the results of the verification of learning outcomes	Review of internship documentation <i>an analysis of the portfolio of documentation obtained during internship, including professional internship, and other practical classes and studio sessions, as well as the documentation developed in order to obtain credit for such classes; verification of the description, necessary attachments, opinions and grades before submitting the portfolio for acceptance</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Restoration of disturbed water ecosystem
Module code		AQ_021
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		Rozpoznaje zjawiska zachodzące w środowisku jako podstawę do oceny jego aktualnego stanu i prognozowania dalszych procesów. Identyfikuje zagrożenia dla środowiska przyrodniczego wynikające z procesów związanych z działalnością gospodarczą człowieka oraz potrafi ocenić ich skalę i wpływ na obserwowane zmiany. Zna czynniki abiotyczne i biotyczne podlegające monitoringowi ze względu na ich znaczenie dla zdrowia człowieka i oceny stanu środowiska przyrodniczego.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Understanding the concept of sustainability of aquatic ecosystems by applying the principles of interactions between natural sciences and engineering.	AQ2_U09	3	
		AQ2_W01	4	
		AQ2_W03	4	
		AQ2_W04	3	
		AQ2_W06	3	
02	To be able to apply the methods of analysis of aquatic ecosystems aiming to recognize the level of disturbance.	AQ2_U02	4	
		AQ2_U03	4	
03	To be able to apply methods and tools for hydrological regime, water quality, morphological and biological parameters restoration in aquatic ecosystems.	AQ2_U04	3	
04	be able to predict the long-term impact of anthropogenic activities on aquatic ecosystems and to plan mitigation measures.	AQ2_U06	3	
		AQ2_U07	3	
05	Understanding the aesthetic, economic and social consequences of restoring disturbed aquatic ecosystems.	AQ2_K02	3	
		AQ2_K03	3	

06	To be able to make suggestions and recommendations for sustainable water resources management.	AQ2_U05 AQ2_U07	3 3
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9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
c06	Demonstration methods	Demonstration-imitation <i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	15	exam	01, 02	a01
02	seminar	15	course work	03, 04	c06, d03
03	laboratory classes	15	course work	05, 06	c06, d03

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
a03	Preparation for classes	Developing practical skills <i>activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)</i>	No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Technologies of wastewater treatment
Module code		AQ_011
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		During the course, students acquire knowledge about the composition of wastewater, physical, chemical and biochemical processes taking place in domestic, industrial and surface wastewater, investigate wastewater treatment methods and intensive and extensive wastewater treatment technologies, and acquaint with the principles of design of primary, secondary and tertiary cleaning circuits. Students will be able to select appropriate wastewater treatment and sludge treatment technology and equipment, will be able to assess the environmental impact of water treatment plants and to choose measures for its reduction.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	To describe the composition of wastewater, its pollution parameters and the main factors influencing wastewater pollution	AQ2_W01	3	
		AQ2_W02	5	
02	To gain an understanding of biochemical processes in wastewater and nature, the conditions of these processes.	AQ2_W04	5	
		AQ2_W05	5	
03	Describe mechanical and biological wastewater treatment methods and technologies.	AQ2_W04	4	
		AQ2_W05	4	
04	Describe natural wastewater treatment methods and technologies.	AQ2_K02	3	
		AQ2_U01	4	
		AQ2_U02	5	
		AQ2_U03	4	
05	To gain an understanding of biological and chemical methods of biological and chemical removal of phosphorus and nitrogen from wastewater.	AQ2_U03	3	
		AQ2_U04	4	

		AQ2_U06	4
06	Describe the sewage sludge formed during the sewage treatment process, its treatment methods.	AQ2_U03 AQ2_U04 AQ2_U06	4 4 4
07	To be able to select the technological scheme of wastewater treatment, and equipment, perform calculations of their parameters to ensure the required treatment results.	AQ2_U07 AQ2_W02	4 4

9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
c06	Demonstration methods	Demonstration-imitation <i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
e01	Practical methods	Laboratory exercise / experiment <i>[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	30	exam	01, 02, 05	a01, c06
02	laboratory classes	30	course work	03, 04, 06, 07	c06, d03, e01

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
a03	Preparation for classes	Developing practical skills <i>activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)</i>	No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class	No

		<i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Water management and modelling
Module code		AQ_003
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		In the laboratory, the student acquires the skills to acquire tools for the preparation of a surface water model, prepare these tools for work, parameterization of the model, its calibration and validation. The classes additionally prepare the student for the task of choosing a tool for the purpose of work and selecting appropriate input data, as well as evaluating a model made by oneself or by another person. During the consultation, the student has the opportunity to obtain more detailed information on the tools and methods presented during laboratory classes. They also have the opportunity to obtain support in the preparation of a project that is the basis for verifying learning outcomes.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Knowledge of the purposes of applying mathematical modeling of surface waters and the principles of selection of tools (models) and data for the purpose of modeling.	AQ2_W07	4	
02	Knowledge of data sources for surface water modelling and the ability to obtain them.	AQ2_U01 AQ2_W07	3 3	
03	Ability to use sample tools for surface water modelling in a GIS environment, including the procedure of obtaining and installing software.	AQ2_U02 AQ2_W07	3 3	
04	Knowledge of the basics of modelling results validation and model calibration. Knowledge of the basic criteria for the selection of calibration parameters along with the assessment of model uncertainty. Ability to perform calibration and evaluate its effectiveness.	AQ2_U03 AQ2_W07	4 4	

9.	Methods of conducting classes		
Code	Category	Name (description)	
b07	Problem-solving methods	Activating methods: a case study	

		a comprehensive description of a phenomenon connected with the selected discipline; reflecting the reality, presenting the 'what', 'where' and 'how' of the phenomenon, i.e., all of its key aspects to be discussed in class; used as a reproduction, presentation, discussion or diagnosis of factors that shape the phenomenon or interact with it; an in-depth qualitative analysis and evaluation of a selected phenomenon
d01	Programmed learning methods	Working with a computer e.g., Webquest; implementation of educational tasks using electronic and digital devices, computer programs and Internet applications; the academic teacher acts as a consultant; students' work is carried out step by step according to the plan laid down by the person teaching the course and following his instructions, and proceeds towards producing the indicated results within the set deadline
d02	Programmed learning methods	Working with a programmed textbook working with a textbook containing instructional material covering part of or the entire curriculum of the module as well as a formula for studying the content; includes working with a subject textbook, an atlas, a catalogue, a problem book, etc.
e04	Practical methods	Project scheduling proceeding according to the steps proposed within a specific methodology for the completion of a task; e.g., identifying project objectives, determining the result, identifying strengths, limitations, opportunities and threats (SWOT), establishing a schedule of activities, assessing resources, establishing an implementation plan; the initial diagnosis; the reassessment of assumptions; the process of preparing the practical implementation of a project

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	laboratory classes	60	course work	01, 02, 03, 04	b07, d01, d02, e04

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a01	Preparation for classes	Search for materials and review activities necessary for class participation reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes	Yes
a03	Preparation for classes	Developing practical skills activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)	No
a05	Preparation for classes	Production/preparation of tools, materials or documentation necessary for class participation developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes	No
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content reading through the syllabus and getting acquainted with its content	Yes
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes reading through the academic teacher's comments, assessments and opinions on the implementation	Yes

		<i>of the task aimed at checking the level of the achieved learning outcomes</i>	
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Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.

1.	Field of study	Aquamatics - Interdisciplinary Management of Water Environments
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	General information about the module	
Module name		Water molecular monitoring
Module code		AQ_016
Number of the ECTS credits		6
Language of instruction		English
Purpose and description of the content of education		The module would likely aim to equip students with a comprehensive understanding of the molecular techniques and tools used in monitoring aquatic environments. The learning outcomes would focus on both theoretical knowledge and practical skills needed to assess and analyze aquatic ecosystems at the molecular level.
List of modules that must be completed before starting this module (if necessary)		not applicable

8.	Learning outcomes of the module			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)	
01	Acquire and understand the basic principles of molecular biology and genetics as they apply to aquatic organisms and ecosystems.	AQ2_W01	4	
02	Understand the dynamics of aquatic ecosystems and the role of molecular monitoring in assessing biodiversity, population dynamics and ecosystem health.	AQ2_W01	4	
03	Identify and evaluate different molecular markers used in aquatic monitoring, such as DNA, RNA and protein markers.	AQ2_W02	4	
04	Demonstrate the ability to collect, handle and preserve water and biological samples for molecular analysis.	AQ2_U01	4	
05	Analyze molecular data using bioinformatics tools to interpret genetic diversity, identify species and assess population structures.	AQ2_U03 AQ2_W02	4 4	
06	Develop a critical opinion on whether a molecular approach is appropriate, define its limitations, and identify additional approaches to integrate monitoring approaches to address an environmental question.	AQ2_U08	4	
07	Based on the acquired knowledge, he/she will be able to organise teamwork leading to the solution of a problem in the field of aquatic molecular ecology and take a leading role in the team, carrying out the task according to the principles of good laboratory and field practices and interpersonal coexistence, and prepare a report on the completion of the task.	AQ2_K01 AQ2_U10	4 4	
08	Uses the acquired knowledge in the field of molecular ecology based on various sources, including internet sources, in the process of self-education as well as in the process of awareness raising and ecological safety and ecological	AQ2_K05 AQ2_U01	4 4	

	education in accordance with the principles of ethics.	AQ2_U10	4
		AQ2_W04	4

9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
c06	Demonstration methods	Demonstration-imitation <i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
e01	Practical methods	Laboratory exercise / experiment <i>[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment</i>

10. Forms of teaching					
Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	lecture	40	exam	01, 02, 03	a01
02	laboratory classes	20	course work	04, 05, 06, 07, 08	c06, d03, e01

11. The student's work, apart from participation in classes, includes in particular:			
Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	No
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class</i>	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: <https://usosweb.us.edu.pl>.