SYLLABUS – A COURSE DESCRIPTION

I. General informaion

1. Course name: **Research methods in hydrobiological studies_2020en**
2. Course code:
3. Course type (compulsory or optional): **optional**
4. Study programme name: **Environmental protection**
5. Cycle of studies (1st or 2nd cycle of studies or full master's programme): **2nd cycle of studies**
6. Educational profile (general academic profile or practical profile): **general academic profile**
7. Year of studies (if relevant): **I**
8. Type of classes and number of contact hours (e.g. lectures: 15 hours; practical classes: 30 hours):

> **lectures: 10 hours**
> **practical classes: 20 hours**

9. Number of ECTS credits: **3**
10. Name, surname, academic degree/title of the course lecturer/other teaching staff:

> **dr hab. Elżbieta Szeląg-Wasielewska, eszelag@amu.edu.pl**
> **prof. dr hab. Natalia Kuczyńska-Kippen, nkippen@amu.edu.pl**
> **dr hab. Piotr Klimaszyk, pklim@amu.edu.pl**
> **dr Ryszard Piotrowicz, ryszardp@amu.edu.pl**

11. Language of classes: **english**
12. Online learning – yes (partly – online / fully – online) / no:

II. Detailed information

1. Course aim (aims)

> **1. Show of the significance of methods and research techniques at the development of the hydrobiological knowledge - historical aspect**
> **2. Transfer of knowledge about ecological classification of aquatic organisms being an object of hydrobiological research (bacterioplankton, phytoplankton, periphyton, macrophytes, benthos, fishs)**
> **3. Discussing of manners sampling and research methods applied in the field and in the laboratory with reference to mentioned above groups of organisms**
> **4. Transfer of knowledge about equipment, microscopes and other equipment as instruments of work of hydrobiologist**
> **5. Acquainting with criteria of selections of research and analytical methods, and with evaluation of the ecological and trophic state of waters**
> **6. Educating the ability of correct observation micro- and macroscopic of examined groups of organisms**
> **7. Developing of abilities of data interpretation get in the evaluation the state of aquatic ecosystems and preparation of elaboration**
> **8. Developing the ability of the teamwork including the health and safety at work in terrain and laboratory conditions**

2. Pre-requisites in terms of knowledge, skills and social competences (if relevant)

> **Knowledge from range of ecology and taxonomy, readiness for realization of individual task and in group work**

3. Course learning outcomes (EU) in terms of knowledge, skills and social competences and their reference to study programme learning outcomes (EK)

Course learning outcome symbol (EU)	On successful completion of this course, a student will be able to:	Reference to study programme learning outcomes (EK)
EU_01	to describe methods of the sampling of the plankton (bacteria, algae), periphyton, macrophytes, zoobenthos and ichtiofauna, knows the equipment back	K_W06, K_U02
EU_02	to characterize different types of microscopes, to select and to prepare them for work, to prepare samples for microscopic research and devices for quality and quantitative investigations of bacterioplankton, phytoplankton, periphyton, benthos, macrophytes	K_U01, K_K04
EU_03	to describe and to apply parameters defining composition and the structure of groups of organisms, knows nutritional and size groups of organisms and is able to use groups of organisms to the evaluation of the water quality	K_W02, K_U02
EU_04	to characterize classification systems of aquatic plants, their populations and communities, to assess the ecological status of waters	K_W06, K_U02
EU_05	to describe methods of estimation of the population of fish, groups of the reproduction of fish, classification of water ecosystems on the basis on the fish communities, to apply zoobentos for the evaluation of lakes and rivers	K_W06, K_U02

4. Learning content with reference to course learning outcomes (EU)

Course learning content	Course learning outcome symbol (EU)
Methods in hydrobiology - historic review. Sampling of plankton (bacteria, algae) periphyton, macrophytes, benthos and fish. Time and the frequency of sampling. Establishment of sampling stations. Preserving samples. Characteristics of the equipment and apparatus	EU_01
Types of microscopes and applying them in hydrobiological examinations for quality and quantitative evaluation of bacterioplankton, phytoplankton, zooplankton, periphyton, benthos, macrophytes.	EU_02

Parameters defining composition and structure of communities. Feed and size group of organisms in water environment. Grouping of organisms in the assessment of water quality. Employment of biological parameters in hydrobiological research.	EU_03
Classification of aquatic plants. Macrophytes in different types of waters. Testing methods of aquatic plants and sedge associations and their populations and communities. Assessment of ecological status of standing water bodies (lakes) with use Ecological State Macrophyte Index (ESMI) Assessment of ecological status of river with use the Macrophyte Index for Rivers (MIR)	EU_04
Methods for the investigation of fish communities in water ecosystems. Classification of lakes and rivers on the basis on the fish. Fish capture methods, determination of fish abundance, age and growth rate, and fish biometric features. Methods of zoobenthos sampling, sieving and taxonomical determination. Benthic invertebrates as indicator of ecological state of freshwater ecosystems	EU_05

5. Reading list

Wydawnictwa książkowe
1. Allan J.D, Castillo M.M.: Stream ecology: structure and functionof of running waters, Springer, Dordrecht, The Nederlands, 2007
2. Ciecierska H.: Macrophytes as indicators of the ecological status of lakes (in Polish), Monographs and Dissertations, Olsztyn, 2008
3. Ciecierska H., Kolada A., Soszka H., Gołub M. : A Method for Macrophyte-Based Assessment of the Ecological Status of Lakes, Developed and Implemented for the Purpose of Environmental Protection in Poland., BALWOIS, Republic of Macedonia , 2010
4. Krebs Ch. J.:: Ecology: The experimental analysis of distribution and abundance, Benjamin Cummings, Warszawa, 2000
5. Schwoerbel J.: Methods od hydrobiology: (Freshwater biology), Pengamon Press, Oxfort, London, Toronto, Sydney, Australia, 2011
6. Sorokin Y.J. : Aquatic microbial ecology, Backhuys Publishers, Leiden, 1999
7. Szoszkiewicz K., Zbierska J., Jusik Sz., Zgoła T. : Rivers Assessment Method using Macrophytes - methodical manual for the evaluation and classification of the ecological status of running waters based on aquatic plants (in Polish) , Bogucki Scientific Publishers , Poznań, 2010
8. Wetzel R. G., Likens G. E. : Limnological analyses , Springer-Verlag, New York, Berlin, Heidelberg, 1991
Artykuły w czasopismach
1. Allende L., Fontanarrosa M.S., Murano A., Sinistro R. (2019): Phytoplankton functional group classifications as tool for biomonitoring shallow lekes:a case study, Knowl. Manag. Aquat. Ecosyst., 420, 5

III. Additional information

1. Teaching and learning methods and activities to enable students to achieve the intended course learning outcomes (please indicate the appropriate methods and activities with a tick or/and suggest different methods)

Teaching and learning methods and activities	
Lecture with a multimedia presentation	X
Interactive lecture	
Problem – based lecture	
Discussions	
Text-based work	
Case study work	
Problem-based learning	
Educational simulation/game	
Task – solving learning (eg. calculation, artistic, practical tasks)	X
Experiential work	X
Laboratory work	X
Scientific inquiry method	
Workshop method	
Project work	
Demonstration and observation	X
Sound and/or video demonstration	X
Creative methods (eg. brainstorming, SWOT analysis, decision tree method, snowball technique, concept maps)	
Group work	X

2. Assessment methods to test if learning outcomes have been achieved (please indicate with a tick the appropriate methods for each LO or/and suggest different methods)

Assessment methods	Course learning outcome symbol				
	EU_1	EU_2	EU_3	EU_4	EU_5
Written exam					
Oral exam					
Open book exam					
Written test	X	X	X	X	X
Oral test	X	X	X	X	X
Multiple choice test					
Project					
Essay					
Report	X	X	X	X	X
Individual presentation					
Practical exam (performance observation)					
Portfolio					

3. Student workload and ECTS credits

Activity types	Mean number of hours spent on each activity type

Contact hours with the teacher as specified in the study programme	30
Preparation for classes	10
Reading for classes	10
Essay / report / presentation / demonstration preparation, etc.	10
Project preparation	
Term paper preparation	
Exam preparation	15
Total hours	75
Total ECTS credits for the course	3

4. Assessment criteria according to AMU in Poznan grade system

Very good (bdb; 5,0): Excellent knowledge and abilities
Good plus (+db; 4,5): Knowledge and abilities at the level of very good
Good (db; 4,0): Knowledge and abilities at the level of good
Satisfactory plus (+dst; 3,5): Knowledge and abilities at the level of a bit over sufficing
Satisfactory (dst; 3,0): Knowledge and abilities at the level of sufficient
Unsatisfactory (ndst; 2,0): Scarce knowledge and abilities