

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-25/26Z						
Course title: Assessment of the ecological condition of surface waters (ocena stanu ekologicznego wód powierzchniowych) (KIERUNKOWE)					Course code: SPR201AIJ3450_25S	
Name of field of study: Hydrobiology						
Mode and cycle of study: first-degree, full - time		Profile of study: general academic			Specialty:	
Course / module status obligatory			Language of instruction: semester: 4 - english language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	4	discussion classes	30	0	pg	5
		zaj cia terenowe	15	0	pg	
Total			45			5
Course / module coordinator		dr TOMASZ KREPSKI				
Course instructor		dr TOMASZ KREPSKI				
Course / module objectives		The aim of the course is to familiarize students with the latest methods of surface water monitoring using biological, geomorphological and physico-chemical methods. The student should be able to choose the appropriate method to assess the condition of surface waters and carry out the collection and analysis of the samples, interpret the results and draw conclusions. The student is ready to constantly update the knowledge of water monitoring and initiate actions for protection the environment.				
Prerequisites		The student should know the basic concepts of limnology and potamology and be able to recognize aquatic organisms				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	The student knows and understands the basic research, laboratory and field methods and techniques used in the monitoring of the aquatic environment	K_W02 K_W07		
	2	EP2	The student knows and understands the basics of mathematical calculation methods that enable the proper assessment of the condition of the water environment	K_W08		
skills	1	EP3	The student is able to choose the appropriate laboratory and field methods and research techniques and correctly use them in the monitoring of the aquatic environment	K_U03 K_U04		
	2	EP4	The student is able to make mathematical calculations on the basis of the collected data enabling the proper assessment of the condition of the water environment	K_U01 K_U02		
	3	EP5	The student is able to properly present the results of the monitoring, along with the correct interpretation of the obtained results	K_U05		
social competences	1	EP6	The student is ready to carry out the monitoring in a reliable manner with respect to ethical principles and to share the collected data.	K_K03 K_K05		
CONTENT					Semester	No. of hours
						including e-learning

Subject title: Assessment of the ecological condition of surface waters (ocena stanu ekologicznego wód powierzchniowych)					
Format of instruction: discussion classes					
1. Biological monitoring of aquatic environment - phytoplankton		4	4	0	
2. Biological monitoring of aquatic environment - macrophytes		4	4	0	
3. Biological monitoring of aquatic environment - zooplankton		4	4	0	
4. Biological monitoring of aquatic environment - benthic macroinvertebrates		4	4	0	
5. Biological monitoring of aquatic environment - fishes		4	4	0	
6. River Habitat Survey (RHS)		4	4	0	
7. Monitoring of physical and chemical parameters of water		4	2	0	
8. Analysis of the collected results, passing the course		4	4	0	
Format of instruction: zajęcia terenowe					
1. Methods of collecting biological samples (zooplankton, benthos)		4	3	0	
2. Processing and analysis of the collected material		4	6	0	
3. The Macrophyte Index for Rivers (MIR)		4	3	0	
4. River Habitat Survey 4 3 0		4	3	0	
Modes of delivery	Presentation of methods of monitoring research, calculations and analysis of monitoring data, presentation and discussion of the results of water environment monitoring				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	PROJEKT			EP1,EP2,EP3,EP4,EP5	
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZECZ OBSERWACJAMI)			EP6	
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.				
Grading criteria	Preparation of two reports: one of the seminars and the other of the field classes. Positive grade from reports.				
	Grade calculation principles				
	The final grade for the course is the average of grades from room and field classes.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	4	Assessment of the ecological condition of surface waters (ocena stanu ekologicznego wód powierzchniowych)		Arytmetyczna	
	4	Assessment of the ecological condition of surface waters (ocena stanu ekologicznego wód powierzchniowych) [wiczenia]	zaliczenie z ocen		
	4	Assessment of the ecological condition of surface waters (ocena stanu ekologicznego wód powierzchniowych) [zajęcia terenowe]	zaliczenie z ocen		
Basic reading	Frank R. Burden; Ulrich Foerstner; Ian D. McKelvie; Alex Guenther (2002): Environmental Monitoring Handbook, The McGraw-Hill Companies, Inc, United States of America				
Supplementary reading	David B Lindenmayer, Gene E Likens (2018): Effective Ecological Monitoring, The Commonwealth Scientific and Industrial Research Organisation				
STUDENT WORKLOAD					
		No. of hours			
		including e-learning			

Contact hours	45	0
Participation in test / exam	2	0
Preparation for contact hours	25	0
Private reading and studying	20	0
Participation in tutorials	5	0
Preparation of project / essay / etc.	0	0
Preparation for test / exam	28	0
TOTAL workload	125	
ECTS credits	5	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-25/26Z							
Course title: Bioinformatics (bioinformatyka) (KIERUNKOWE)					Course code: SPR201AIJ3450_16S		
Name of field of study: Hydrobiology							
Mode and cycle of study: first-degree, full - time			Profile of study: general academic		Specialty:		
Course / module status obligatory				Language of instruction: semester: 3 - english language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS	
				including e-learning			
2	3	discussion classes	30	0	pg	2	
Total			30			2	
Course / module coordinator		dr hab. LIDIA SKUZA					
Course instructor		dr hab. LIDIA SKUZA					
Course / module objectives		<p>To introduce students to basic issues in bioinformatics, in particular to techniques of amino acid and nucleotide sequence analysis</p> <p>To introduce students to biological screening methods and literature databases</p> <p>The student acquires practical skills in using biological databases and is able to use basic and specialized programs as well as bioinformatics tools, is aware of the importance of these tools in scientific research, is ready to systematically deepen knowledge by learning new programs and methods used in bioinformatics</p>					
Prerequisites		Basic computer skills, knowledge of genetics					
LEARNING OUTCOMES							
Category	No.	Code	Description	Ref. to programme benchmarks			
knowledge	1	EP1	The student has knowledge of the basic techniques of bioinformatic sequence and structure analysis of biopolymers	K_W02 K_W06 K_W08			
	2	EP2	The student has knowledge of terminology used in conducting research with bioinformatics methods	K_W01 K_W08			
skills	1	EP3	The student uses basic functions of specialized bioinformatics software used to compare and edit amino acid and nucleotide sequences and to analyze the spatial structure of proteins	K_U03 K_U04			
	2	EP4	The student is able to independently analyze the data available in biological and literature databases	K_U02 K_U04			
social competences	1	EP5	The student is ready to work independently and in a team on the implementation of projects involving bioinformatic data analysis	K_K01 K_K05			
CONTENT					Semester	No. of hours	
						including e-learning	
Subject title: Bioinformatics (bioinformatyka)							
Format of instruction: discussion classes							
1. Capabilities and example applications of basic bioinformatics systems and biological databases (NCBI Entrez, RCSB PDB, Uniprot, Expasy, PROSITE i PRINTS, Gene Ontology)					3	8	0
2. Techniques for quantitative comparison of amino acid and nucleotide sequences (BLAST, FASTA, Clustal)					3	8	0
3. Basic methods of molecular phylogenetic analysis (models of molecular evolution, distance and optimization methods for determination of phylogenetic trees)					3	8	0
4. DNA barcoding analysis					3	6	0

Modes of delivery	case studies, problem solving, lecture with multimedia presentation, exercises				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods					No. of learning outcome from the syllabus
	KOLOKWIUM				EP1,EP2,EP3,EP4,EP5
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.				
Grading criteria	Final test - includes knowledge of exercises and recommended literature Presentation of the results based on skills acquired during the course				
	Grade calculation principles				
	The final grade is the grade for the course				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	Bioinformatics (bioinformatyka)		Ważona	
	3	Bioinformatics (bioinformatyka) [wiczenia]	zaliczenie z ocen		1,00
Basic reading	Andreas D. Baxevanis (Editor), B. F. Francis Ouellette (Editor) (2004): Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, 3rd Edition, Wiley				
	Paul G. Higgs Teresa K. Attwood (2005): Bioinformatics and Molecular Evolution, Blackwell Publishing Ltd.				
Supplementary reading					
STUDENT WORKLOAD					
		No. of hours			
		including e-learning			
Contact hours	30		0		
Participation in test / exam	2		0		
Preparation for contact hours	3		0		
Private reading and studying	5		0		
Participation in tutorials	5		0		
Preparation of project / essay / etc.	0		0		
Preparation for test / exam	5		0		
TOTAL workload	50				
ECTS credits	2				

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-25/26Z							
Course title: Herpetology and mammalogy (herpetologia i teriologia) (KIERUNKOWE)					Course code: SPR201AIJ3450_21S		
Name of field of study: Hydrobiology							
Mode and cycle of study: first-degree, full - time			Profile of study: general academic		Specialty:		
Course / module status obligatory				Language of instruction: semester: 4 - english language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS	
				including e-learning			
2	4	discussion classes	15	0	pg	3	
		lecture	15	0	pg		
Total			30			3	
Course / module coordinator		dr hab. ŁUKASZ JANKOWIAK					
Course instructor		dr hab. ŁUKASZ JANKOWIAK					
Course / module objectives		Knowledge about the factors determining the biology of amphibians, reptiles and mammals Ability to identification specimens of amphibians, reptiles and mammals					
Prerequisites		Knowledge of the zoology at the secondary school grade					
LEARNING OUTCOMES							
Category	No.	Code	Description			Ref. to programme benchmarks	
knowledge	1	EP1	Defines the sources of biodiversity of amphibians, reptiles and mammals. Discusses the causes of the biodiversity in terms of time and geography			K_W05	
skills	1	EP2	Uses the scientific literature			K_U02	
social competences	1	EP3	maintains a fact-based and critical attitude in evaluating his own work			K_K01	
CONTENT					Semester	No. of hours	
							including e-learning
Subject title: Herpetology and mammalogy (herpetologia i teriologia)							
Format of instruction: lecture							
1. Amphibians and reptiles: origin					4	1	0
2. Amphibians and reptiles: reproduction and life histories					4	2	0
3. Amphibians and reptiles: physiological ecology					4	1	0
4. Amphibians and reptiles: Behavioural ecology					4	2	0
5. Amphibians and reptiles: population dynamics and conservation					4	2	0
6. Mammals: origins					4	1	0
7. Mammals: reproduction and life history					4	2	0
8. Mammals: behavioural ecology					4	2	0
9. Mammals: population dynamics and conservation					4	2	0

Format of instruction: discussion classes					
1. Classification and diversity: Caecilians		4	1	0	
2. Classification and diversity: Caudata		4	2	0	
3. Classification and diversity: Anura		4	2	0	
4. Classification and diversity: Turtles		4	2	0	
5. Classification and diversity: Crocodylians		4	2	0	
6. Classification and diversity: Tuataras and Lizards		4	1	0	
7. Classification and diversity: Snakes		4	1	0	
8. General classification and diversity of mammals with the distinction of mammals in aquatic environments		4	4	0	
Modes of delivery	prezentacja multimedialna, opracowanie projektu, praca w grupach				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOLOKWIUM			EP1,EP2	
	SPRAWDZIAN			EP1,EP2	
	PROJEKT			EP1,EP2,EP3	
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.				
Grading criteria	<ul style="list-style-type: none"> - writing test - performance of a final work: slides - the final credit based on partial credits received during the semester for specific activities (partial tests covering the knowledge of the lectures and recommended literature, completion of classes, presentation and tests) 				
	Grade calculation principles				
	The final grade will be calculated as an average of the grades (1:1) acquired by the student.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	4	Herpetology and mammalogy (herpetologia i teriologia)		Arytmetyczna	
	4	Herpetology and mammalogy (herpetologia i teriologia) [wiczenia]	zaliczenie z ocen		
	4	Herpetology and mammalogy (herpetologia i teriologia) [wykład]	zaliczenie z ocen		
Basic reading	Donald W. Linzey (2020): Vertebrate biology : systematics, taxonomy, natural history, and conservation Third edition, Johns Hopkins University Press, Baltimore, Maryland				
	Hadoram Shirihai, Brett Jarrett (2021): Whales, Dolphins and Seals: A field guide to the marine mammals of the world, Bloomsbury Wildlife				
	Mike Pingleton, Joshua Holbrook (2019): The Field Herping Guide: Finding Amphibians and Reptiles in the Wild (Wormsloe Foundation Nature Books) , University of Georgia Press				
Supplementary reading	Annalisa Berta, James L. Sumich, Kit M. Kovacs (2005): Marine Mammals - Evolutionary Biology, Academic Press				
	Laurie J. Vitt, Janalee P. Caldwell (2013): Herpetology: An Introductory Biology of Amphibians and Reptiles, Academic Press				
	Thomas A. Jefferson, Stephen Leatherwood, Marc A. Webber (1993): Marine Mammals of the World, FAO and UNEP, Rzym				
STUDENT WORKLOAD					
		No. of hours			
		including e-learning			
Contact hours	30		0		

Participation in test / exam	4	0
Preparation for contact hours	15	0
Private reading and studying	5	0
Participation in tutorials	4	0
Preparation of project / essay / etc.	8	0
Preparation for test / exam	9	0
TOTAL workload	75	
ECTS credits	3	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-24/25Z							
Course title: Hydrology (hydrologia) (KIERUNKOWE)					Course code: SPR201AIJ3446_27S		
Name of field of study: Hydrobiology							
Mode and cycle of study: first-degree, full - time			Profile of study: general academic		Specialty:		
Course / module status obligatory				Language of instruction: semester: 5 - english language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS	
				including e-learning			
3	5	discussion classes	15	0	pg	2	
		lecture	15	0	pg		
Total			30			2	
Course / module coordinator		prof. dr hab. in . ROBERT CZERNIAWSKI					
Course instructor		prof. dr hab. in . ROBERT CZERNIAWSKI					
Course / module objectives		Familiarize students with the phenomena and processes concerning inland water hydrology, both surface water and underground one. Educate students in the ability to analyze, including graphical and statistical ones, phenomena and processes occurring in the terrestrial part of the hydrosphere. Educating students of readiness to care for water resources.					
Prerequisites		Basic knowledge of physical geography at the high school level.					
LEARNING OUTCOMES							
Category	No.	Code	Description	Ref. to programme benchmarks			
knowledge	1	EP1	One knows and understands to an advanced degree the concepts and phenomena concerning the hydrology of inland waters, both surface and underground ones.	K_W01			
	2	EP2	Knows and understands the physical tool necessary to understand the functioning of the hydrosphere.	K_W07			
skills	1	EP3	One can use hydrological data, synthesize and analyze them and use it to solve specific problems.	K_U02			
	2	EP4	Can communicate with the other people using specialized terminology in the field of hydrology.	K_U05			
	3	EP5	Is able to use the knowledge in the field of hydrology to carry out written studies and analyzes.	K_U01			
social competences	1	EP6	One is ready to critically evaluate his/her knowledge of hydrology and recognize the importance of that knowledge in solving hydrobiological problems.	K_K02			
CONTENT					Semester	No. of hours	
						including e-learning	
Subject title: Hydrology (hydrologia)							
Format of instruction: lecture							
1. The cycle of water circulation in nature, water balance and river basin characteristics.					5	3	0
2. Characteristics of watercourses, river network and river runoff.					5	3	0
3. Lakes, their types, morphology and morphometry; lake content.					5	4	0

4. Characteristics of marshy areas.		5	2	0	
5. Groundwater, their origin and classification		5	2	0	
6. Glaciers, their genesis, types and supply; glacier movement.		5	1	0	
Format of instruction: discussion classes					
1. Determination of the surface watershed of the catchment area for the selected river.		5	3	0	
2. River kilometers; calculating the expansion, torsion and slope of the river.		5	2	0	
3. Analysis of the seasonal variability of river outflows.		5	2	0	
4. Characteristics of marshy areas.		5	2	0	
5. Preparation of a graph of fluctuations in the groundwater table during the year		5	2	0	
6. Preparation of a bathymetric plan and a section through the lake basin.		5	2	0	
7. Determination of morphometric parameters of the lake.		5	2	0	
Modes of delivery	The lecture with multimedia materials, performance of written analyzes (including graphic and computational analyzes), discussion.				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOLOKWIUM			EP1,EP2,EP6	
	PRACA PISEMNA/ ESEJ/ RECENZJA			EP1,EP2,EP3,EP5	
	ZAJ CIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJ)			EP1,EP2,EP3,EP4,EP5,EP6	
Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.					
Grading criteria	The condition for passing the course is positive completion of all written studies and positive passing of the final test.				
	Grade calculation principles				
	The final grade for the course is the average of grades from lectures and practical classes in a 1: 1 ratio.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	5	Hydrology (hydrologia)		Arytmetyczna	
	5	Hydrology (hydrologia) [wiczenia]	zaliczenie z ocen		
	5	Hydrology (hydrologia) [wykład]	zaliczenie z ocen		
Basic reading	T. Davie (2008): Fundamentals of hydrology, 2nd ed., Routledge, Taylor & Francis Group, London and New York				
Supplementary reading	P. Edwards, K. Wiliard & J. Schoonover (2015): Fundamentals of watershed hydrology, Journal of Conterporary Water Research & Education , www. usda.gov; publication is available only online				
STUDENT WORKLOAD					
		No. of hours			
			including e-learning		
Contact hours	30		0		
Participation in test / exam	1		0		
Preparation for contact hours	2		0		
Private reading and studying	3		0		

Participation in tutorials	9	0
Preparation of project / essay / etc.	0	0
Preparation for test / exam	5	0
TOTAL workload	50	
ECTS credits	2	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-25/26Z						
Course title: Ichthyology (ichtiologia) (KIERUNKOWE)					Course code: SPR201AIJ3450_1S	
Name of field of study: Hydrobiology						
Mode and cycle of study: first-degree, full - time			Profile of study: general academic		Specialty:	
Course / module status obligatory				Language of instruction: semester: 3 - english language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	discussion classes	20	0	pg	3
		lecture	20	0	pg	
Total			40			3
Course / module coordinator		prof. dr hab. in . ROBERT CZERNIAWSKI				
Course instructor		prof. dr hab. in . ROBERT CZERNIAWSKI				
Course / module objectives		The aim of the course is to familiarize students with the systematics, taxonomy and biology of fish. After completing the course the student is able to identify the most important species and taxonomic groups of fish.				
Prerequisites		Basic knowledge of biology				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	The student knows and understands at an advanced level selected facts, concepts and theories, which are the basic general knowledge in the field of natural sciences, forming the theoretical foundations of ichthyology	K_W01		
	2	EP2	The student knows and understands the basic research and laboratory methods and techniques used in contemporary ichthyology	K_W02		
	3	EP3	The student knows and understands at an advanced level the relationships of ichthyology with other natural disciplines, enabling the understanding of the principles of the functioning of organisms and the interpretation and generalization of knowledge	K_W03		
skills	1	EP4	The student is able to properly select and use sources of scientific information, critically analyze and evaluate them, and perform data synthesis to formulate and solve problems	K_U02		
	2	EP5	The student is able to properly select and use appropriate research methods and tools, and present the results of observations and conclusions, including the analysis of professional literature, in written and oral form, using advanced information and communication techniques	K_U03		
	3	EP6	The student is able to carry out observations and measurements using appropriate research and laboratory tools and methods, as well as interpret the obtained results and draw conclusions based on his knowledge	K_U04		

social competences	1	EP7	The student is ready to critically assess his knowledge and received content and to recognize the importance of general and specialist knowledge in the field of ichthyology in solving cognitive and practical problems, and to consult with experts the difficulties with solving problems on his own.	K_K02	
	2	EP8	The student is ready to fulfill social obligations, including sharing knowledge in the field of ichthyology with others and co-organizing activities for the social environment.	K_K03	
CONTENT			Semester	No. of hours	
					including e-learning
Subject title: Ichthyology (ichtiologia)					
Format of instruction: lecture					
1. Fish systematics			3	5	0
2. Adaptation of fish to life in a diversified aquatic environment			3	3	0
3. Migratory and sedentary fish			3	3	0
4. Fish reproduction			3	3	0
5. Development and growth in early ontogenesis.			3	3	0
6. Species protection of fish			3	3	0
Format of instruction: discussion classes					
1. Identifying fish species			3	2	0
2. Morphological and anatomical structure of fish, cartilaginous fish			3	3	0
3. Morphological and anatomical structure of fish, bone skeleton fish			3	3	0
4. Methods for determining the age of fish			3	3	0
5. The structure and growth of gonads and the cycle of annual development of the gonads.			3	3	0
6. Methods of determining the stages of gonad development			3	3	0
7. Development of fish in artificial conditions			3	3	0
Modes of delivery	macroscopic and microscopic observation, drawings, multimedia presentation				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOLOKWIUM			EP1,EP2,EP3,EP4,EP7	
	ZAJ CIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJ)			EP5,EP6,EP7,EP8	
Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.					
Grading criteria	The condition for obtaining credit for the exercises is a positive grade, which is the average grade obtained from the test verifying the mastery of the knowledge provided to the student in the course of the exercises. The condition for obtaining a credit for the lecture is a positive grade from the test verifying the mastery of the knowledge passed to the student during the lectures.				
	Grade calculation principles				
	Average of the final grade for exercises and lectures.				

	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
Final grade calculation method	3	Ichthyology (ichtiologia)		Arytmetyczna	
	3	Ichthyology (ichtiologia) [wiczenia]	zaliczenie z ocen		
	3	Ichthyology (ichtiologia) [wykład]	zaliczenie z ocen		
Basic reading	Helfman, G., Collette, B. B., Facey, D. E., Bowen, B. W. (2009): The diversity of fishes: biology, evolution, and ecology. , John Wiley & Sons.				
Supplementary reading					
STUDENT WORKLOAD					
		No. of hours			
				including e-learning	
Contact hours		40	0		
Participation in test / exam		5	0		
Preparation for contact hours		5	0		
Private reading and studying		10	0		
Participation in tutorials		5	0		
Preparation of project / essay / etc.		0	0		
Preparation for test / exam		10	0		
TOTAL workload		75			
ECTS credits		3			

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-25/26Z						
Course title: Microbiology of the aquatic environment (mikrobiologia rodowiska wodnego) (PODSTAWOWE)					Course code: SPR201AIJ3450_11S	
Name of field of study: Hydrobiology						
Mode and cycle of study: first-degree, full - time			Profile of study: general academic		Specialty:	
Course / module status obligatory				Language of instruction: semester: 3 - english language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	laboratory	30	0	pg	5
		lecture	30	0	e	
Total			60			5
Course / module coordinator		dr hab. PAULINA NIED WIEDZKA-RYSTWEJ				
Course instructor		dr hab. PAULINA NIED WIEDZKA-RYSTWEJ				
Course / module objectives		Acquainting with the structure and physiology of microorganisms, including environmental ones, and demonstrating the role of microorganisms in environment. Acquire skills of performing laboratory test in environmental microbiology. Learning to plan, execute, and learn from an experiment. Independent and group work.				
Prerequisites		Knowledge of cell structure. Basic manual skills. Ability to work in team.				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	The student describes the morphological and physiological features of bacteria, with particular emphasis on those that affect their use in the environment.	K_W01 K_W03		
	2	EP2	The student knows the structure and characteristics of viruses (bacteriophages) and fungi.	K_W04		
	3	EP3	Has knowledge of bacteria, viruses and fungi performing bioindication functions. Describes the role of microorganisms in biogeochemical cycles and biodegradation.	K_W01 K_W06		
	4	EP4	Knows selected methods, techniques and research tools used in microbiology of the aquatic environment.	K_W02 K_W08		
skills	1	EP5	Can plan and execute an experiment with using basic microbiological methods.	K_U03		
	2	EP6	Uses available sources of information, including electronic ones, to obtain, collect and process data from various fields of knowledge related to hydrobiology.	K_U02		
	3	EP7	Performs alone or in a team, under the supervision of a research supervisor, simple research tasks and expert opinions as well as tasks in the field of hydrobiology, noticing their microbiological aspects.	K_U04 K_U07		
social competences	1	EP8	Understands the need for continuous training in the field environmental microbiology.	K_K05		
	2	EP9	Is aware of the influence of microorganisms on shaping the natural environment.	K_K02		

CONTENT	Semester	No. of hours			
			including e-learning		
Subject title: Microbiology of the aquatic environment (mikrobiologia rodowiska wodnego)					
Format of instruction: lecture					
1. Characteristics of bacteria; their morphological properties; physiology: growth and reproduction. Metabolic processes of microorganisms in the environmental aspect. Application of microorganisms in environmental protection. Ecology of microorganisms and bacterial variability.	3	10	0		
2. Structure and physiology of viruses (bacteriophages) and fungi in waters.	3	8	0		
3. Biological characteristics of the more important groups of microorganisms, i.e. bacteria, viruses and fungi, with particular emphasis on species with bioindication functions. Role of microorganisms in biogeochemical and biodegradation cycles, i.e. the participation of microorganisms in changes in the environment.	3	12	0		
Format of instruction: laboratory					
1. Methods of identifying microorganisms	3	12	0		
2. Microbiology of waters. Methods of assessing these environments with particular water (bacteria of physiological groups, sanitary bacteria, bacteriophages FRNA and FDNA). Microbiological analysis of water samples taken from selected water reservoirs.	3	18	0		
Modes of delivery	multimedia presentation, group work, practical classes				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods			No. of learning outcome from the syllabus		
	EGZAMIN PISEMNY		EP1,EP2,EP3,EP4		
	KOLOKWIUM		EP1,EP2,EP3,EP4		
	PRACA PISEMNA/ ESEJ/ RECENZJA		EP1,EP2,EP3,EP4,EP6		
	ZAJ CIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJ)		EP5,EP7,EP8,EP9		
	Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.				
Grading criteria	Exam - written test concerning the knowledge of the lectures; passing laboratories on the basis of activity, and written tests				
	Grade calculation principles				
	The final grade is 75% of the grade for the written lectures and 25% of the grade for the laboratories.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	Microbiology of the aquatic environment (mikrobiologia rodowiska wodnego)		Wa ona	
	3	Microbiology of the aquatic environment (mikrobiologia rodowiska wodnego) [laboratorium]	zaliczenie z ocen		0,25
	3	Microbiology of the aquatic environment (mikrobiologia rodowiska wodnego) [wykład]	egzamin		0,75
Basic reading	Błaszczuk, M.K. (2023): Mikrobiologia rodowisk, Wydawnictwo Naukowe PWN, Warszawa				
	Murray, P.R.; Pfaller, M.A.; Tenover, K.S. (red. wyd. polskie Martirosian G.; Przondo-Mordarska, A; Szkaradkiewicz, A.) (2022): Mikrobiologia, Edra Urban & Partner, Wrocław				
Supplementary reading	Kowal, K.; Libudzisz, Z.; akowska, Z. (red.) (2023): Mikrobiologia techniczna. Tom 1, Wydawnictwo Naukowe PWN, Warszawa				
	Kowal, K.; Libudzisz, Z.; akowska, Z. (red.) (2023): Mikrobiologia techniczna. Tom 2, Wydawnictwo Naukowe PWN, Warszawa				
	Czasopisma: Aura Ekologia polska Kosmos Laboratorium Medycyna rodowiskowa Polish Journal of Ecology Polish Journal of Environmental Studies Post py Mikrobiologii Problemy Higieny i Epidemiologii Przegl d epidemiologiczny Roczniki PZH Wszech wiat				

STUDENT WORKLOAD		
	No. of hours	
		including e-learning
Contact hours	60	0
Participation in test / exam	2	0
Preparation for contact hours	20	0
Private reading and studying	10	0
Participation in tutorials	10	0
Preparation of project / essay / etc.	3	0
Preparation for test / exam	20	0
TOTAL workload	125	
ECTS credits	5	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-24/25Z						
Course title: Nature conservation (ochrona przyrody) (KIERUNKOWE)					Course code: SPR201AIJ3450_28S	
Name of field of study: Hydrobiology						
Mode and cycle of study: first-degree, full - time			Profile of study: general academic		Specialty:	
Course / module status obligatory				Language of instruction: semester: 5 - english language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
3	5	konwersatorium	30	0	pg	2
Total			30			2
Course / module coordinator		prof. dr hab. AGNIESZKA POPIELA				
Course instructor		prof. dr hab. AGNIESZKA POPIELA				
Course / module objectives		The aim of the course is to familiarize students with the problems and methods of biodiversity conservation. Students can define the threats of nature, indicate the forms of its protection, and see and assess the existing and potential threats to the environment, is ready to appreciate the value of the natural environment.				
Prerequisites		biological knowledge at the high school level.				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	Student knows and understands the history and development of scientific conservation	K_W02 K_W03		
	2	EP2	Student knows, understands and describes the current legal basis for nature protection	K_W02		
	3	EP3	Student knows the main types of ecosystems, identifies threats, knows methods of their protection.	K_W02 K_W03		
skills	1	EP4	The student analyzes the processes taking place in nature	K_U02		
	2	EP5	The student is able to properly select and use appropriate research methods and tools, and present the results of observations and conclusions, including the analysis of professional literature, in written and oral form, using advanced information and communication techniques	K_U02 K_U03		
	3	EP6	The student is able to carry out observations and measurements using appropriate research and laboratory tools and methods, as well as interpret the obtained results and draw conclusions based on his knowledge	K_U02 K_U03		
social competences	1	EP7	The student is ready to critically assess his knowledge and received content and to recognize the importance of general and specialist knowledge in the field of nature conservation in solving cognitive and practical problems, and to consult with experts the difficulties with solving problems on his own.	K_K02 K_K04		
	2	EP8	The student is ready to fulfill social obligations, including sharing knowledge in the field of nature conservation with others and co-organizing activities for the social environment.	K_K04 K_K05		

CONTENT	Semester	No. of hours			
			including e-learning		
Subject title: Nature conservation (ochrona przyrody)					
Format of instruction: konwersatorium					
1. History of the biodiversity of the biosphere	5	4	0		
2. History of human influence on the biosphere.	5	4	0		
3. The history and development of scientific conservation.	5	4	0		
4. Main types of ecosystems and methods of their protection, with particular emphasis on hydrogenic ecosystems.	5	4	0		
5. Types and conditions of surface protection.	5	4	0		
6. Types and conditions of species protection.	5	4	0		
7. Alien and invasive species.	5	4	0		
8. Red lists and books, atlases of protected and rare species, internet databases	5	2	0		
Modes of delivery	Lecture, presentation				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods			No. of learning outcome from the syllabus		
	SPRAWDZIAN		EP1,EP2,EP3,EP4,EP5,EP6,EP7,EP8		
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.				
Grading criteria	Positive evaluation of the test.				
	Grade calculation principles				
	The final grade for the course is the grade from discussion classes.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	5	Nature conservation (ochrona przyrody)		Ważona	
	5	Nature conservation (ochrona przyrody) [konwersatorium]	zaliczenie z ocen		1,00
Basic reading	Andrew S. Pullin (2012): Conservation Biology, Cambridge University Press, Cambridge				
Supplementary reading					
STUDENT WORKLOAD					
		No. of hours			
				including e-learning	
Contact hours	30		0		
Participation in test / exam	2		0		
Preparation for contact hours	5		0		
Private reading and studying	5		0		
Participation in tutorials	3		0		

Preparation of project / essay / etc.	0	0
Preparation for test / exam	5	0
TOTAL workload	50	
ECTS credits	2	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-25/26Z							
Course title: Ornithology (ornitologia) (KIERUNKOWE)					Course code: SPR201AIJ3450_39S		
Name of field of study: Hydrobiology							
Mode and cycle of study: first-degree, full - time			Profile of study: general academic		Specialty:		
Course / module status obligatory				Language of instruction: semester: 3 - english language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS	
				including e-learning			
2	3	discussion classes	15	0	pg	3	
		lecture	15	0	pg		
Total			30			3	
Course / module coordinator		dr hab. ŁUKASZ JANKOWIAK					
Course instructor		dr hab. ŁUKASZ JANKOWIAK					
Course / module objectives		Knowledge about the factors determining the biology of birds. Ability to birds identification and ability to count indicator bird species. The student is aware of the importance of birdlife in nature.					
Prerequisites		Knowledge of the zoology at the secondary school grade					
LEARNING OUTCOMES							
Category	No.	Code	Description	Ref. to programme benchmarks			
knowledge	1	EP1	Defines the sources of birds biodiversity, discusses the causes of the biodiversity in terms of time and geography	K_W06			
skills	1	EP2	Uses the scientific literature	K_U02			
social competences	1	EP3	Student maintains a fact-based and critical attitude in evaluating his own work	K_K01			
CONTENT					Semester	No. of hours	
							including e-learning
Subject title: Ornithology (ornitologia)							
Format of instruction: lecture							
1. Origins					3	3	0
2. Form and function					3	3	0
3. Behaviour and communication					3	2	0
4. Behaviour and the environment					3	2	0
5. Avian life histories					3	3	0
6. Population dynamics and conservation					3	2	0
Format of instruction: discussion classes							
1. Identification of wetland birds					3	6	0
2. Identification of farmland birds					3	3	0

3. Identification of urban birds		3	3	0	
4. Identification of forest birds		3	3	0	
Modes of delivery	slides presentation, project development, working in groups				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOLOKWIUM			EP1,EP2	
	SPRAWDZIAN			EP1,EP2	
	PREZENTACJA			EP1,EP2,EP3	
Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.					
Grading criteria	<ul style="list-style-type: none"> - writing test - performance of a final work: slides - the final credit based on partial credits received during the semester for specific activities (partial tests covering the knowledge of the lectures and recommended literature, completion of classes, presentation and tests) 				
	Grade calculation principles				
	The final grade will be calculated as an average of the grades (1:1) acquired by the student.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	Ornithology (ornitologia)		Arytmetyczna	
	3	Ornithology (ornitologia) [wykład]	zaliczenie z ocen		
	3	Ornithology (ornitologia) [wiczenia]	zaliczenie z ocen		
Basic reading	Lindsay Young , Eric VanderWerf (2022): Conservation of Marine Birds 1st Edition, Academic Press				
	Frank B. Gill , Richard O. Prum, Scott Kuehner Robinson (2019): Ornithology (Foruth Edition), W.H. Freeman, Macmillan Learning, New York				
	Lars Svensson; Killian Mullarney; Dan Zetterstro?m; P J Grant (2023): Collins bird guide, Collins, London				
Supplementary reading	E.A. Schreiber, Joanna Burger (2002): Biology of Marine Birds, CRC Press , Boca Raton, London, New York, Washington D.C				
STUDENT WORKLOAD					
		No. of hours			
		including e-learning			
Contact hours	30		0		
Participation in test / exam	4		0		
Preparation for contact hours	15		0		
Private reading and studying	5		0		
Participation in tutorials	4		0		
Preparation of project / essay / etc.	8		0		
Preparation for test / exam	9		0		
TOTAL workload	75				
ECTS credits	3				

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-25/26Z							
Course title: Physiology of water animals (fizjologia zwierz t wodnych) (KIERUNKOWE)					Course code: SPR201AIJ3450_23S		
Name of field of study: Hydrobiology							
Mode and cycle of study: first-degree, full - time		Profile of study: general academic			Specialty:		
Course / module status obligatory				Language of instruction: semester: 4 - english language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS	
				including e-learning			
2	4	laboratory	15	0	pg	3	
		lecture	15	0	pg		
Total			30			3	
Course / module coordinator		dr hab. WIOLETA DUDZI SKA					
Course instructor		dr hab. WIOLETA DUDZI SKA					
Course / module objectives		Understanding the relationship between the course of life activities of aquatic animals and the environmental factors, which, as a result, will allow us to understand the behavioral and physiological adaptations to life in various aquatic habitats. Students will be able to perform analyze the course of physiological processes conditioning the functioning of animals in the aquatic environment, be responsible for jointly performed tasks.					
Prerequisites		Basic knowledge of the biology of aquatic animals.					
LEARNING OUTCOMES							
Category	No.	Code	Description	Ref. to programme benchmarks			
knowledge	1	EP1	The student has knowledge of the basic physiological processes of aquatic animals. Knows and understands their regulation and connections enabling the maintenance of homeostasis, as well as the adaptation of animals to their living environment.	K_W01 K_W06			
skills	1	EP2	The student is able to use his knowledge to analyze the course of physiological processes conditioning the functioning of animals in the aquatic environment. Uses basic techniques and methods to obtain physiological and environmental data and is able to link them with each other. Can plan and organize work independently and in a team in order to effectively perform specific tasks.	K_U01 K_U03 K_U04 K_U07			
social competences	1	EP3	The student knows the limitations of his own knowledge and skills and understands the need to constantly improve professional qualifications, as well as personal and social competences, is ready to perform various roles in a team, submit to the rules of teamwork and be responsible for jointly performed tasks.	K_K01 K_K02			
CONTENT					Semester	No. of hours	
						including e-learning	
Subject title: Physiology of water animals (fizjologia zwierz t wodnych)							
Format of instruction: lecture							
1. Water as the habitat of animals. Mechanisms underlying adaptation to life.					4	2	0

2. Animal water balance, osmoregulation and excretion. Adaptations to life in fresh and salt waters.		4	2	0	
3. Adaptations of the cardiovascular and respiratory systems to life in aquatic environments: animal respiration without specialized respiratory organs, respiratory organs of aquatic animals, respiration and gas exchange mechanism.		4	3	0	
4. Thermal adaptations of aquatic organisms in different habitats: physiological effects of temperature change, temperature regulation in cold and warm conditions, thermal conductivity.		4	2	0	
5. Different forms of adaptation of aquatic animals to the nutrition process: food intake, symbiotic food supply, digestion - intra- and extracellular, food intake regulation and energy demand.		4	2	0	
6. The impact of environmental conditions on the structure and functioning of the sensory organs, the nervous and endocrine systems. Circadian and seasonal rhythms in animals as a direct requirement of the environment.		4	2	0	
7. Physiological and behavioral adaptations to extreme aquatic habitats.		4	2	0	
Format of instruction: laboratory					
1. Measuring plasma osmolality in fish acclimated to different salinities.		4	3	0	
2. Physiology of the cardiovascular and circulatory system of fish. Heart function. Taking blood samples, making and staining smears and their microscopic analyses.		4	3	0	
3. Respiration in fish- determining the level of oxygen dissolved in water and determining the influence of temperature on the respiration process.		4	3	0	
4. Functions of the excretory system - determination of the content of ammonium ion and ammonia in water.		4	3	0	
5. Anatomical and physiological differences in the digestive systems of predatory fish and planktivores. Digestive enzymes.		4	3	0	
Modes of delivery	Lecture Labs				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOLOKWIUM			EP1	
	ZAJ CIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJ)			EP1,EP2,EP3	
	Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.				
Grading criteria	Lectures: test composed of single-choice questions. In order to get the mark 3,0 the student must give 60% of correct answers. Labs: test composed of single-choice questions. In order to get the mark 3,0 the student must give 60% of correct answers.				
	Grade calculation principles				
	The overall grade is calculated as a mean average of grades obtained during lectures and labs.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	4	Physiology of water animals (fizjologia zwierz t wodnych)		Arytmetyczna	
	4	Physiology of water animals (fizjologia zwierz t wodnych) [wykład]	zaliczenie z ocen		
	4	Physiology of water animals (fizjologia zwierz t wodnych) [laboratorium]	zaliczenie z ocen		
Basic reading	Baldisserotto B., Mancera Romero J.M. , Kapoor B.G (1997): Fish Osmoregulation, Science Publishers				
	Schmidt-Nelsen K (1997): Animal Physiology: Adaptation and Environment, 5th Edition., Cambridge University Press				
	Willmer P., Stone G., Johnston I. (2004): Environmental Physiology of Animals, 2nd Edition. , Wiley-Blackwell				
Supplementary reading					

STUDENT WORKLOAD		
	No. of hours	
		including e-learning
Contact hours	30	0
Participation in test / exam	2	0
Preparation for contact hours	18	0
Private reading and studying	15	0
Participation in tutorials	0	0
Preparation of project / essay / etc.	0	0
Preparation for test / exam	10	0
TOTAL workload	75	
ECTS credits	3	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-25/26Z						
Course title: Physiology of water plants (fizjologia roślin wodnych) (KIERUNKOWE)					Course code: SPR201AIJ3450_15S	
Name of field of study: Hydrobiology						
Mode and cycle of study: first-degree, full - time		Profile of study: general academic			Specialty:	
Course / module status obligatory				Language of instruction: semester: 3 - english language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	laboratory	30	0	pg	3
		lecture	15	0	pg	
Total			45			3
Course / module coordinator		dr DANUTA CEMBROWSKA-LECH				
Course instructor		dr DANUTA CEMBROWSKA-LECH				
Course / module objectives		The aim of the course is to present the basic life processes and functioning of water plants, regulatory mechanisms during plant growth and development and the influence of environmental factors on these processes. The students know and use basic biochemical methods. Students are ready to use knowledge and information to solve problems related to the functioning of plants.				
Prerequisites		Students should have a basic knowledge of structure and properties of organic compounds, plant cell and tissues structure, together with the ability of working in a chemical laboratory.				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	Student has a basic knowledge of biochemical and physiological processes in water plants.	K_W01 K_W06		
	2	EP2	Student knows the principle of mechanisms that regulate the general vital functions of water plants.	K_W01 K_W03		
	3	EP3	Student knows the basic methods, techniques, tools and materials used to solve simple tasks in the field of study.	K_W02 K_W07		
skills	1	EP4	Student is able to evaluate and interpret the basic biological parameters of plants in order to diagnose the physiological and biochemical status of water plants.	K_U02		
	2	EP5	Student is able to plan and perform experiments related to the assessment of physiological processes in plants.	K_U03 K_U04		
	3	EP6	Student analyzes the conditions of physiological processes in plant organisms in terms of the possibility of their optimization.	K_U02 K_U03 K_U04		
	4	EP9	Student is able to work individually and in a group, assuming different roles in it, aiming to achieve the assumed goal.	K_U07		
	5	EP10	Is able to properly define priorities in order to accomplish a task defined by himself or others.	K_U08		
social competences	1	EP8	Is aware of the level of their knowledge and skills and understands the need for lifelong learning.	K_K02		
CONTENT					Semester	No. of hours
						including e-learning

Subject title: Physiology of water plants (fizjologia ro lin wodnych)					
Format of instruction: lecture					
1. Introduction to physiology of water plant. Mineral nutrition.		3	3	0	
2. Solute transport.		3	2	0	
3. Respiration.		3	2	0	
4. Photosynthesis.		3	4	0	
5. Phytohormones in the regulation of physiological processes.		3	2	0	
6. Stress physiology.		3	2	0	
Format of instruction: laboratory					
1. Chemical analysis of plant material.		3	4	0	
2. Water and mineral management.		3	4	0	
3. Determination of the assimilation pigments level.		3	4	0	
4. Photosynthesis intensity - influence of external factors.		3	4	0	
5. Respiration intensity - influence of external factors.		3	4	0	
6. Influence of phytohormones on plant growth and development.		3	6	0	
7. Plant resistance to stress.		3	4	0	
Modes of delivery	Lecture- multimedia presentations. Lab- group work and independent work, carrying out experiments laboratory.				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOLOKWIUM			EP1,EP2,EP4,EP6,EP8	
	SPRAWDZIAN			EP1,EP2,EP4,EP8	
	PROJEKT			EP1,EP10,EP2,EP3,EP4,EP6,EP8,EP9	
	ZAJ CIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJ)			EP1,EP10,EP2,EP3,EP4,EP5,EP6,EP9	
	Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.				
Grading criteria	Lecture- written exam. Lab- Activity in class, passing a test and reports on observation and discussing the results of the experiments.				
	Grade calculation principles				
	The final grade of the course coordinator is calculated as the arithmetic mean of the grades from laboratory exercises and lectures.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	Physiology of water plants (fizjologia ro lin wodnych)		Arytmetyczna	
	3	Physiology of water plants (fizjologia ro lin wodnych) [wykład]	zaliczenie z ocen		
	3	Physiology of water plants (fizjologia ro lin wodnych) [laboratorium]	zaliczenie z ocen		
Basic reading	Lincoln Taiz, Eduardo Zeiger, Ian M. M?ller, and Angus Murphy (2022): Plant Physiology and Development, Sinauer Associates, Oxford University Press				
Supplementary reading	Lambers, Hans, Oliveira, Rafael (2019): Plant Physiological Ecology, Springer Nature				

STUDENT WORKLOAD		
	No. of hours	
		including e-learning
Contact hours	45	0
Participation in test / exam	4	0
Preparation for contact hours	4	0
Private reading and studying	4	0
Participation in tutorials	7	0
Preparation of project / essay / etc.	5	0
Preparation for test / exam	6	0
TOTAL workload	75	
ECTS credits	3	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-25/26Z						
Course title: Potamology and limnology (potamologia i limnologia) (KIERUNKOWE)					Course code: SPR201AIJ3450_13S	
Name of field of study: Hydrobiology						
Mode and cycle of study: first-degree, full - time		Profile of study: general academic			Specialty:	
Course / module status obligatory				Language of instruction: semester: 3 - english language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	discussion classes	30	0	pg	6
		lecture	30	0	e	
Total			60			6
Course / module coordinator		prof. dr hab. in . ROBERT CZERNIAWSKI				
Course instructor		prof. dr hab. in . ROBERT CZERNIAWSKI				
Course / module objectives		The aim of the course is to familiarize students with the functioning of natural freshwater basins, both standing and flowing. After completing the course, the student has knowledge of the most important phenomena that determine the proper functioning of standing and running waters. Student is able to assess the condition of properly functioning river and lake ecosystems. Is aware of the effects of human activity on the functioning of watercourses.				
Prerequisites		Basic knowledge of biology				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	The student understands the specificity of the functioning of running and standing waters	K_W01		
	2	EP2	The student understands the specificity of the functioning of running and standing waters	K_W03		
	3	EP3	The student has knowledge of mathematics, physics and chemistry to understand the natural phenomena occurring in running and standing waters, knows the techniques and tools needed to assess the environment of flowing and stagnant waters	K_W02 K_W07		
skills	1	EP4	The student is able to plan and perform analyzes using the research techniques and methods in the assessment of the environment of running and standing waters. Te student based on the known methods can predict the environmental conditions of the river in relation to the current state of the environment	K_U01 K_U04		
	2	EP5	The student acquires the skills to recognize and explain the phenomena related to the functioning of river ecosystems using the available information sources	K_U03		
	3	EP6	The student performs simple tasks, alone or in a team and under the supervision of a tutor. He can make a critical assessment of the functioning and usefulness of technical solutions used in the protection of water basins environment	K_U07		

social competences	1	EP7	The student is ready to cooperate with the community, institutions and entrepreneurs for the protection of the aquatic environment.	K_K03	
	2	EP8	The student is ready to constantly update his knowledge in the field of improving the condition of natural waters	K_K06	
CONTENT			Semester	No. of hours	
					including e-learning
Subject title: Potamology and limnology (potamologia i limnologia)					
Format of instruction: lecture					
1. Properties and types of running waters			3	2	0
2. Biological resources and interactions in running waters			3	2	0
3. Circulation of inorganic and organic matter in running waters			3	2	0
4. Biocenosis of running waters			3	2	0
5. The meaning of flow-through basins in functioning of running waters			3	2	0
6. River Continuum Concept			3	2	0
7. Properties and types of standing waters			3	2	0
8. Lake eutrophication			3	2	0
9. Biological resources and interactions in standing waters			3	2	0
10. Circulation of inorganic and organic matter in standing waters			3	2	0
11. Biocenosis of standing waters			3	2	0
12. Funkcjonowanie i rola mokradeł w prawidłowym utrzymaniu stosunków wodnych			3	2	0
13. River-lake ecotones			3	2	0
14. Astatic basins			3	2	0
15. Transitional waters			3	2	0
Format of instruction: discussion classes					
1. Predictability of the environmental conditions of running waters based on the knowledge of the current abiotic state			3	2	0
2. The role of flow-through basins as clarifiers of organic matter in rivers			3	2	0
3. Inter-structural connections in river			3	2	0
4. Assessment of the drifted organic matter mass on the river ecosystem functioning			3	2	0
5. The role of morphometric indicators of running waters and river valleys in the context of ecosystem features			3	2	0
6. Designing the biological assumptions in the protection of river habitats and organisms			3	2	0
7. Predictability of the environmental conditions of standing waters based on the knowledge of the current abiotic state			3	2	0
8. The role of morphometric indicators of standing waters and river valleys in the context of ecosystem features			3	2	0
9. Morphometric characteristics of lakes			3	2	0
10. Ecological zones of lakes and the role of macrophytes in shaping the ecological conditions of standing waters			3	2	0
11. Physico-chemical properties of the water and sediments of lakes			3	2	0
12. Diel migrations of aquatic organisms			3	4	0
13. Assessment of the use of catchment area on the standing waters functioning			3	2	0
14. Assessment of the use of catchment area on the running waters functioning			3	2	0

Modes of delivery	group work, independent calculations, multimedia presentation				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods					No. of learning outcome from the syllabus
	EGZAMIN USTNY				EP1,EP3,EP4,EP8
	KOLOKWIUM				EP2,EP7,EP8
	ZAJ CIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJ)				EP5,EP6
	Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.				
Grading criteria	The condition for obtaining credit for the exercises is a positive grade, which is the average grade obtained from the test verifying the mastery of the knowledge provided to the student during the exercises. The condition for obtaining a credit for the lecture is a positive grade from the oral exam verifying the mastery of the knowledge passed to the student during the lectures.				
	Grade calculation principles				
	Average of the final grade for exercises and lectures				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	Potamology and limnology (potamologia i limnologia)		Arytmetyczna	
	3	Potamology and limnology (potamologia i limnologia) [wykład]	egzamin		
	3	Potamology and limnology (potamologia i limnologia) [wiczenia]	zaliczenie z ocen		
Basic reading	Allan, J. D., Castillo, M. M. (2007): Stream ecology: structure and function of running waters. , Springer Science & Business Media.				
	J.G. Tundisi, T. Matsumura-Tundisi (2012): Limnology, Taylor & Francis				
Supplementary reading					
STUDENT WORKLOAD					
		No. of hours			
		including e-learning			
Contact hours	60		0		
Participation in test / exam	2		0		
Preparation for contact hours	20		0		
Private reading and studying	18		0		
Participation in tutorials	25		0		
Preparation of project / essay / etc.	0		0		
Preparation for test / exam	25		0		
TOTAL workload	150				
ECTS credits	6				

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-25/26Z							
Course title: Statistics (statystyka) (PODSTAWOWE)					Course code: SPR201AIJ3450_12S		
Name of field of study: Hydrobiology							
Mode and cycle of study: first-degree, full - time			Profile of study: general academic		Specialty:		
Course / module status obligatory				Language of instruction: semester: 3 - english language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS	
				including e-learning			
2	3	conversation	30	0	pg	2	
Total			30			2	
Course / module coordinator		dr hab. ŁUKASZ JANKOWIAK					
Course instructor		dr hab. ŁUKASZ JANKOWIAK					
Course / module objectives		The aim is to introduce a number of basic concepts and techniques that should allow the student to get started with practical statistics. Acquiring practical skills to use the statistical software R. The student is ready to solve environmental problems using statistical analyzes.					
Prerequisites		Knowledge of the mathematics at the secondary school grade					
LEARNING OUTCOMES							
Category	No.	Code	Description			Ref. to programme benchmarks	
knowledge	1	EP1	Student knows the basic statistical methods used in hydrobiology			K_W02	
	2	EP2	knows and understands the basics of mathematical and statistical methods and information technologies that enable the proper description and analysis of processes at various levels of the organization of the living world			K_W08	
skills	1	EP3	Student can interpret the obtained statistical results and draw conclusions based on their knowledge			K_U04	
social competences	1	EP4	Student is aware of limitation of statistical solutions and the limitation of obtained data to describing biological complexity			K_K01 K_K02	
CONTENT					Semester	No. of hours	
						including e-learning	
Subject title: Statistics (statystyka)							
Format of instruction: conversation							
1. R language essentials					3	2	0
2. Probability and distributions					3	2	0
3. One- and two-sample tests					3	2	0
4. Regression and correlation					3	2	0
5. ANOVA and Kruskal-Wallis					3	2	0
6. Tabular data					3	2	0
7. Power and the computation of sample size					3	2	0

8. Limitations of Linear Regression Applied on Ecological Data		3	2	0	
9. Things Are Not Always Linear; Additive Modelling		3	2	0	
10. Mixed Effects Modelling		3	2	0	
11. GLM and GAM for Count Data		3	3	0	
12. GLM and GAM for Absence-Presence and Proportional Data		3	2	0	
13. Zero-Truncated and Zero-Inflated Models for Count Data		3	2	0	
14. Ordination analysis		3	3	0	
Modes of delivery	the examples of statistical solutions, multimedia slides, using of R statistical software				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOLOKWIUM			EP1,EP2,EP3,EP4	
	ZAJ CIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJ)			EP1,EP2,EP3,EP4	
	Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.				
Grading criteria	The basis of the credit is the positive grade obtained by the student in the practical test of R software use to solve the given problem.				
	Grade calculation principles				
	The final grade for the course is the grade from discussion classes .				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	Statistics (statystyka)		Wa ona	
	3	Statistics (statystyka) [konwersatorium]	zaliczenie z ocen		1,00
Basic reading	Robert Stinerock (2022): Statistics with R: A Beginner's Guide Second Edition, SAGE Publications Ltd				
	Thulin, M. (2024): Modern Statistics with R, CRC Press				
	W. N. Venables, D. M. Smith and the R Development Core Team (2024): An Introduction to R. Notes on R: A Programming Environment for Data Analysis and Graphics, R Development Core Team.				
Supplementary reading	Alain F. Zuur, Elena N. Ieno, Neil J. Walker, Anatoly A. Saveliev, Graham M. Smith (2011): Mixed Effects Models and Extensions in Ecology with R, Springer, NY, USA				
	Peter Dalgaard (2008): Introductory Statistics with R, Springer, Denmark				
STUDENT WORKLOAD					
		No. of hours			
		including e-learning			
Contact hours	30		0		
Participation in test / exam	2		0		
Preparation for contact hours	6		0		
Private reading and studying	3		0		
Participation in tutorials	2		0		
Preparation of project / essay / etc.	0		0		
Preparation for test / exam	7		0		

TOTAL workload	50
ECTS credits	2

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-H-O-I-S-25/26Z						
Course title: Water resource management (gospodarowanie zasobami wodnymi) (KIERUNKOWE)					Course code: SPR201AIJ3450_26S	
Name of field of study: Hydrobiology						
Mode and cycle of study: first-degree, full - time		Profile of study: general academic			Specialty:	
Course / module status obligatory			Language of instruction: semester: 4 - english language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	4	conversation	15	0	pg	5
		lecture	15	0	pg	
		zaj cia terenowe	15	0	pg	
Total			45			5
Course / module coordinator		dr hab. ŁUKASZ ŚLUGOCKI				
Course instructor		dr hab. ŁUKASZ ŚLUGOCKI				
Course / module objectives		The aim of the course is to familiarize students with issues related to water management. After completing the course, the student is able to define threats to water resources, know the methods of their protection and treatment, understand the causes of floods, and know methods of preventing their negative effects. The student is ready to take conscious actions in the field of rational use and shaping of water resources.				
Prerequisites		Basic knowledge of geography, chemistry, physics, and biology.				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	knows and understands at an advanced level selected facts, concepts and phenomena related to water resources management	K_W01		
	2	EP2	knows and understands the basic research methods enabling the effective management of water resources	K_W02		
	3	EP3	knows the relationship of hydrobiology with other natural disciplines, enabling the understanding of the principles of water resources management	K_W03		
	4	EP4	knows and understands at an advanced level the current directions of water resources management	K_W05		
skills	1	EP5	is able to use the acquired knowledge to solve complex and unusual problems related to water management	K_U01		
	2	EP6	is able to properly select and use sources of scientific information, critically analyzing them	K_U02		
	3	EP7	is able to properly select and apply appropriate research methods and tools as well as present the results of experiments or observations and conclusions, including the analysis of professional literature	K_U03		
	4	EP8	is able to carry out experiments, observations and measurements using appropriate tools and research methods, as well as interpret the obtained results and draw conclusions based on their knowledge	K_U04		

social competences	1	EP9	is ready to disseminate models of proper conduct in the work environment and outside it, make independent decisions, critically evaluate the activities of its own and of teams and organizations that affect water management	K_K01	
	2	EP10	is ready to critically assess the knowledge and content received and to recognize the importance of general and specialist knowledge in the field of hydrobiology in solving problems related to water resources management	K_K02	
	3	EP11	is ready to fulfill social obligations, including co-organizing activities for rational water management	K_K03	
CONTENT			Semester	No. of hours	
				including e-learning	
Subject title: Water resource management (gospodarowanie zasobami wodnymi)					
Format of instruction: lecture					
1. Water resources (surface water, underground water, drainage basin), threats to water resources (changes in the amount of water resources), sources of water pollution and changes in the water quality.			4	2	0
2. The use of water, its use in economy, tools for the protection of water resources.			4	2	0
3. Actions to maintain good water status (reclamation, revitalization, renaturation, ecohydrology).			4	2	0
4. Treatment plants and other installations used in water restoration.			4	2	0
5. Use of waters in aquaculture, fisheries and angling.			4	2	0
6. Flood prevention and water transport.			4	2	0
7. Water conflicts.			4	2	0
8. Climate changes and water resources.			4	1	0
Format of instruction: conversation					
1. Interpretation of the results of water status assessment (trophic indexes; river, lake, and catchment indicators) for the purposes of making decisions in water resources management			4	2	0
2. Calculation of the effective dose of coagulant for lake reclamation, calculation of the amount of fish for restocking for effective biomanipulation			4	2	0
3. Water for recreation; the effects of excessive eutrophication; observations of cyanobacteria, including potentially toxic species; blooms of cyanobacteria in bathing waters.			4	2	0
4. Observations of organisms living in the activated sludge, evaluation of the activated sludge condition.			4	4	0
5. An experiment with the use of a coagulant and sorption materials in water restoration.			4	5	0
Format of instruction: zajęcia terenowe					
1. Examples of water use and water resource management.			4	15	0
Modes of delivery	microscopic observation, drawings, multimedia presentation, report				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOŁOKWIUM			EP1,EP2,EP3,EP4	
	PRACA PISEMNA/ ESEJ/ RECENZJA			EP1,EP2,EP3,EP4,EP5,EP6	
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJ)			EP10,EP11,EP5,EP6,EP7,EP8,EP9	
Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.					

Grading criteria	The condition for obtaining credit is a positive grade obtained during the tutorials and a test verifying the mastery of the knowledge passed to the student in the course of the lectures and passing the field report.				
	Grade calculation principles				
	Arithmetic mean of practical classes, lectures and field classes				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	4	Water resource management (gospodarowanie zasobami wodnymi)		Arytmetyczna	
	4	Water resource management (gospodarowanie zasobami wodnymi) [zaj cia terenowe]	zaliczenie z ocen		
	4	Water resource management (gospodarowanie zasobami wodnymi) [konwersatorium]	zaliczenie z ocen		
	4	Water resource management (gospodarowanie zasobami wodnymi) [wykład]	zaliczenie z ocen		
Basic reading	Neil S. Grigg (2016): Integrated Water Resource Management, Palgrave Macmillan, London				
Supplementary reading					

STUDENT WORKLOAD

	No. of hours	
		including e-learning
Contact hours	45	0
Participation in test / exam	1	0
Preparation for contact hours	35	0
Private reading and studying	15	0
Participation in tutorials	15	0
Preparation of project / essay / etc.	2	0
Preparation for test / exam	12	0
TOTAL workload	125	
ECTS credits	5	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-GiBE-O-I-S-24/25Z							
Unit: Przedmioty do wyboru V [moduł]							
Course title: Behavioural ecology (ekologia behawioralna) (KIERUNKOWE)					Course code: SPR85AIJ3446_69S		
Name of field of study: genetyka i biologia eksperymentalna							
Mode and cycle of study: first-degree, full - time			Profile of study: general academic		Specialty:		
Course / module status elective			Language of instruction: semester: 6 - english language				
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS	
				including e-learning			
3	6	lecture	10	0	pg	1	
Total			10			1	
Course / module coordinator		dr hab. DARIUSZ WYSOCKI					
Course instructor		dr hab. DARIUSZ WYSOCKI					
Course / module objectives		Acquainting with the issues of animal ethology. Acquisition of the ability to formulate and solve scientific problems through the proper selection of sources and advanced research methods and their critical evaluation in the light of existing and constantly acquired knowledge in the field of ecology and ethology of animals.					
Prerequisites		Basic knowledge of biology					
LEARNING OUTCOMES							
Category	No.	Code	Description	Ref. to programme benchmarks			
knowledge	1	EP1	the student knows the achievements of behavioural ecology	K_W01			
	2	EP2	student describes and characterizes analytical methods and comparative methods used in behavioral ecology.	K_W07			
skills	1	EP3	the student can study literature	K_U02			
social competences	1	EP4	the student shows openness to new ideas and is ready to change his opinion in the light of available data and arguments	K_K03			
CONTENT					Semester	No. of hours	
							including e-learning
Subject title: Behavioural ecology (ekologia behawioralna)							
Format of instruction: lecture							
1. Adaptation, direct and ultimate factors.					6	2	0
2. Evolution of sexuality and sexual selection.					6	2	0
3. Mating systems in humans and animals					6	6	0

Modes of delivery	written works				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods					No. of learning outcome from the syllabus
	KOLOKWIUM				EP1,EP2,EP3,EP4
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.				
Grading criteria	Written work from the content of the lectures. When determining the grades, the rules adopted in the Study Regulations of the University of Szczecin, art. 38 and 44.				
	Grade calculation principles				
	The final grade is equivalent to the grade from the lectures.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	6	Behavioural ecology (ekologia behawioralna)		Ważona	
	6	Behavioural ecology (ekologia behawioralna) [wykład]	zaliczenie z ocen		1,00
Basic reading	Krebs J.R., Davies N.B. (red.) (2009): Behavioural Ecology – An Evolutionary Approach, Wiley-Blackwell, New York				
Supplementary reading	current literature on behavioral ecology				
STUDENT WORKLOAD					
		No. of hours			
		including e-learning			
Contact hours	10		0		
Participation in test / exam	2		0		
Preparation for contact hours	0		0		
Private reading and studying	4		0		
Participation in tutorials	5		0		
Preparation of project / essay / etc.	0		0		
Preparation for test / exam	4		0		
TOTAL workload	25				
ECTS credits	1				

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-Mik-O-I-S-25/26Z						
Unit: Blok przedmiotów w j. zyku angielskim do wyboru [moduł]						
Course title: Introduction to Conservation Genetics (wprowadzenie do genetyki konserwatorskiej) (POZOSTAŁE PRZEDMIOTY / MODUŁY)					Course code: SPR93AIJ3446_33S	
Name of field of study: mikrobiologia						
Mode and cycle of study: first-degree, full - time		Profile of study: general academic			Specialty:	
Course / module status elective			Language of instruction: semester: 3 - english language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	laboratory	20	0	pg	2
		lecture	10	0	pg	
Total			30			2
Course / module coordinator		dr in . JAKUB SKORUPSKI				
Course instructor		dr in . JAKUB SKORUPSKI				
Course / module objectives		<p>Familiarization with the theoretical and practical foundations of gene pool protection in order to preserve biodiversity and ensure the continuity of evolutionary and ecological processes responsible for its development and maintenance. Creating readiness to recognize the importance of knowledge in solving scientific problems and practical tasks related to the protection of the genetic pool of species at risk of extinction.</p> <p>Acquiring practical skills in the field of protection of genetic resources of endangered species.</p> <p>Creating readiness to initiate activities in the field of protection of genetic resources of species and populations threatened with extinction.</p>				
Prerequisites		Basics of genetics and molecular biology				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	Knows and understands the basic concepts of nature conservation and genetics, including population genetics	K_W02 K_W06 K_W10		
	2	EP2	Lists, distinguishes and knows the possibilities of using molecular techniques and research equipment in research and practice in the field of nature conservation	K_W03 K_W11 K_W12		
	3	EP3	Knows the principles of health and safety of laboratory and field work related to the collection, storage and appropriate protection of environmental samples	K_W16 K_W17		
	4	EP4	Knows the basic methods of statistical analysis and IT tools necessary for the proper interpretation of molecular analysis results and their relation to a specific ecological problem.	K_W09 K_W10		
skills	1	EP5	Is able to select appropriate molecular methods for a specific nature conservation problem, as well as to make appropriate interpretations and conclusions based on the results of laboratory experiments	K_U03 K_U05		
social competences	1	EP6	In assessing his own work, he maintains a factual and critical attitude	K_K01 K_K02		
	2	EP7	Is ready to take responsibility for his/her own safety and the safety of others during laboratory experiments and field work	K_K07 K_K08		

CONTENT		Semester	No. of hours		
				including e-learning	
Subject title: Introduction to Conservation Genetics (wprowadzenie do genetyki konserwatorskiej)					
Format of instruction: lecture					
1. Introduction to conservation genetics ? terminology and methodology		3	2	0	
2. Analysis of genetic determinants of the most important threats to biodiversity		3	4	0	
3. Legal and ethical aspects of conservation genetics		3	4	0	
Format of instruction: laboratory					
1. Gene banking. Conservation breeding		3	2	0	
2. eDNA, barcoding and museomics (aDNA, hDNA) in nature conservation		3	4	0	
3. Application of molecular genetic methods in nature conservation		3	4	0	
4. Application of in silico analyses in conservation genetics		3	4	0	
5. Planning ex situ and in situ conservation activities based on conservation genetics		3	4	0	
6. Controversial concepts within conservation genetics ? de-extinction and conservation breeding improvement		3	2	0	
Modes of delivery	Multimedia presentation, Case study analysis, Lecture, Work in groups, In silico analyses/specialized software, Problem discussion				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods			No. of learning outcome from the syllabus		
	KOLOKWIUM		EP1,EP2,EP3,EP4,EP5,EP6,EP7		
	PREZENTACJA		EP4,EP5,EP6		
	Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.				
Grading criteria	The condition for obtaining a credit for the subject is to pass the required content presented in lectures and discussed and required in practical classes. Credit for laboratory exercises - obtained on the basis of attendance, activity and partial grades received during the semester for specific activities and student works.				
	Grade calculation principles				
	The course grade is determined based on the arithmetic mean calculated from the final grades from lectures and laboratory exercises in a 1:1 ratio.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	Introduction to Conservation Genetics (wprowadzenie do genetyki konserwatorskiej)		Arytmetyczna	
	3	Introduction to Conservation Genetics (wprowadzenie do genetyki konserwatorskiej) [wykład]	zaliczenie z ocen		
	3	Introduction to Conservation Genetics (wprowadzenie do genetyki konserwatorskiej) [laboratorium]	zaliczenie z ocen		
Basic reading	Allendorf F.W. (2022): Conservation and the Genomics of Populations, Oxford University Press, Oxford				
	Sher A.A. (2022): Introduction to Conservation Biology, Oxford University Press, Oxford				
Supplementary reading	Ballou J.D., Briscoe D.A., Frankham R. (2009): A Primer of Conservation Genetics, Cambridge University Press, Cambridge				
	Frankham R. (2010): Introduction to Conservation Genetics, Cambridge University Press, Cambridge				
	Skorupski J. (ed.) (2017): Conservation genetics in Poland – theory and practice, Polish Society for Conservation Genetics LUTREOLA, Szczecin				

STUDENT WORKLOAD		
	No. of hours	
		including e-learning
Contact hours	30	0
Participation in test / exam	2	0
Preparation for contact hours	6	0
Private reading and studying	5	0
Participation in tutorials	3	0
Preparation of project / essay / etc.	0	0
Preparation for test / exam	4	0
TOTAL workload	50	
ECTS credits	2	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-Mik-O-I-S-25/26Z						
Unit: Blok przedmiotów w j zyku angielskim do wyboru [moduł]						
Course title: plant diseases and damage diagnostics (diagnostyka chorób i uszkodze ro lin) (POZOSTAŁE PRZEDMIOTY / MODUŁY)					Course code: SPR93AIJ3450_34S	
Name of field of study: mikrobiologia						
Mode and cycle of study: first-degree, full - time		Profile of study: general academic			Specialty:	
Course / module status elective				Language of instruction: semester: 3 - english language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	laboratory	20	0	pg	2
		lecture	10	0	pg	
Total			30			2
Course / module coordinator		dr Piotr Karczy ski				
Course instructor		dr Piotr Karczy ski				
Course / module objectives		The aim of the course is to introduce the student to the issues related to etiology, symptomatology, epidemiology, pathogenesis of plant diseases caused by biotic factors. Acquiring practical skills in recognizing plant diseases based on symptoms and laboratory tests Acquiring skills to work safely for other people in the laboratory				
Prerequisites		Basic knowledge of the problems of Plant Physiology, Biochemistry, Microbiology, Molecular Biology				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	the student knows the basic features of the construction of representatives of various groups of pathogenic organisms, the morphological and anatomical structures they produce, the methods of reproduction and spread in the environment	K_W01 K_W02		
	2	EP2	the student is able to define and characterize concepts concerning the most important phytopathological departments; acquiring knowledge about the role and importance of abiotic factors and pathogens in the environment	K_W02		
	3	EP3	the student knows and understands issues related to plant damage by various biotic factors	K_W02		
	4	EP4	the student knows the principles of classification of these groups of pathogenic organisms and mastered the most important concepts in the field of taxonomy; can recognize disease symptoms in host plants	K_W07		

skills	1	EP5	the student has the ability to logically reason, associate and compare the most important features of building representatives of various groups of pathogenic organisms functioning in the environment and recognizing the symptoms of the disease	K_U03 K_U09 K_U12	
	2	EP6	the student is able to diagnose and identify the causes of plant diseases	K_U09	
	3	EP7	the student is able to carry out tests to check the ability of plants to tolerate biotic stress, apply basic statistical methods to describe the degree of plants damage	K_U01 K_U03 K_U04 K_U05	
	4	EP8	the student has the ability to learn independently, to acquire literature and to update and expand knowledge	K_U08 K_U16	
	5	EP9	the student is able to cooperate in a team, has the ability to solve problems together, carefully performs the assigned tasks	K_U17	
social competences	1	EP10	the student follows the rules of health and safety, takes care of the workplace, the apparatus used and the materials entrusted	K_K07	
	2	EP11	the student is open to new knowledge, aware of the possibilities of its practical application	K_K02 K_K05	
CONTENT			Semester	No. of hours	
					including e-learning
Subject title: plant diseases and damage diagnostics (diagnostyka chorób i uszkodze ro lin)					
Format of instruction: lecture					
1. null			3	3	0
2. null			3	3	0
3. null			3	2	0
4. null			3	2	0
Format of instruction: laboratory					
1. null			3	2	0
2. null			3	3	0
3. null			3	3	0
4. null			3	3	0
5. null			3	3	0
6. null			3	3	0
7. null			3	3	0
Modes of delivery	carry out of experiments, work in groups, Multimedia presentation				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				

Assessment methods		No. of learning outcome from the syllabus
	SPRAWDZIAN	EP1,EP2,EP3,EP4
	PRACA PISEMNA/ ESEJ/ RECENZJA	EP5,EP6,EP7,EP8
	ZAJ CIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJ)	EP10,EP11,EP9
Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.		

Grading criteria	Lectures: written exam to test knowledge gained during lectures (longer say writing)	
	Classes: evaluation based on partial grades received during the semestr for, test, report and the student"s activity in class	
	Grade calculation principles	
Final grade is the arithmetic average of the evaluation of lectures and evaluation of classes calculated in the ratio of 1:1		

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	plant diseases and damage diagnostics (diagnostyka chorób i uszkodze ro lin)		Arytmetyczna	
	3	plant diseases and damage diagnostics (diagnostyka chorób i uszkodze ro lin) [wykład]	zaliczenie z ocen		
	3	plant diseases and damage diagnostics (diagnostyka chorób i uszkodze ro lin) [laboratorium]	zaliczenie z ocen		

Basic reading	Agrios G.N., (2024): Plant Pathology, Academic Press, San Diego California				
	Tronsmo A.M. i wsp. (2020): Plant Pathology and Plant Diseases, CABI, USA				

Supplementary reading	Nicklin J. i wsp. (2021): Mikrobiologia - krótkie wykłady, Wydawnictwo Naukowe PWN, Warszawa				
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STUDENT WORKLOAD

	No. of hours	
		including e-learning
Contact hours	30	0
Participation in test / exam	4	0
Preparation for contact hours	3	0
Private reading and studying	3	0
Participation in tutorials	3	0
Preparation of project / essay / etc.	4	0
Preparation for test / exam	3	0
TOTAL workload	50	
ECTS credits	2	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-Biotech-O-I-S-24/25Z						
Unit: Moduł IV A [moduł]						
Course title: self-purification of water (samooczyszczanie wód) (KIERUNKOWE)					Course code: SPR34AIJ3446_56S	
Name of field of study: biotechnologia						
Mode and cycle of study: first-degree, full - time		Profile of study: general academic			Specialty:	
Course / module status elective			Language of instruction: semester: 6 - english language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
3	6	laboratory	15	0	pg	3
		lecture	15	0	pg	
Total			30			3
Course / module coordinator		dr hab. in . AGNIESZKA SZLAUER-ŁUKASZEWSKA				
Course instructor		dr hab. in . AGNIESZKA SZLAUER-ŁUKASZEWSKA				
Course / module objectives		Understanding the mechanisms of contamination of aquatic ecosystems, the influence of elements of water biocenosis on the status of the aquatic environment, knowledge of hydrochemical and hydrological processes which are important for buffering the pollution and improve the chemical and physical properties of water. Knowledge of methods to assess the degree of contamination and susceptibility for degradation of water bodies with understanding the social aspects of the practical application of this knowledge. Ability to properly identify taxa that are indicators of pollution.				
Prerequisites		general and organic chemistry, physics, biochemistry, microbiology				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	Student recognizes the risks associated with pollution of the water	K_W01 K_W02 K_W06 K_W07		
	2	EP2	Student knows the methods to assess the degree of contamination and susceptibility to degradation of surface water	K_W01 K_W02 K_W03		
	3	EP3	Student describes the basic mechanisms of self-purification process	K_W01 K_W03		
skills	1	EP4	Student evaluates the degree of pollution of surface waters and their susceptibility to degradation	K_U01 K_U02 K_U03		
	2	EP5	Student analyzes empirically obtained data of physical and chemical parameters of water as a result of various biological factors, and draws conclusions based on them	K_U01 K_U02 K_U04		
	3	EP6	Student is able to classify aquatic organisms to specific ecological formation and identify selected indicator species.	K_U01 K_U02 K_U03		
social competences	1	EP8	The student shows an attitude of readiness to the assigned task.	K_K05		
	2	EP9	Student understands the social aspects of the practical application of knowledge and skills.	K_K01 K_K02		

CONTENT		Semester	No. of hours		
				including e-learning	
Subject title: self-purification of water (samooczyszczanie wód)					
Format of instruction: lecture					
1. null		6	2	0	
2. null		6	2	0	
3. null		6	1	0	
4. null		6	2	0	
5. null		6	2	0	
6. null		6	2	0	
7. null		6	2	0	
8. null		6	2	0	
Format of instruction: laboratory					
1. null		6	2	0	
2. null		6	4	0	
3. null		6	5	0	
4. null		6	4	0	
Modes of delivery	<p>Multimedia presentation based on the author's lecture scenario, Carry out a biological experiment in in the laboratory, Practical exercises in the biological laboratory, microscopic observations, execution drawings, Oral discussion of the scope of the conducted exercises / presentation with a discussion</p> <p>The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.</p>				
Assessment methods			No. of learning outcome from the syllabus		
	KOŁOKWIUM		EP1,EP2,EP3,EP4,EP5,EP6,EP9		
	ZAJ CIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJ)		EP6,EP8		
	Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.				
Grading criteria	<p>Presence and activity on exercises.</p> <p>Performing practical tasks entrusted during the exercises</p> <p>Passing the colloquium with the content discussed during the lecture</p>				
	Grade calculation principles				
	<p>Establishing a final grade based on partial marks received during the semester for specific student activities and work.</p> <p>The grade is calculated on the basis of the final grade of the exercises and lectures in the ratio 1: 1</p>				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	6	self-purification of water (samooczyszczanie wód)		Arytmetyczna	
	6	self-purification of water (samooczyszczanie wód) [laboratorium]	zaliczenie z ocen		
	6	self-purification of water (samooczyszczanie wód) [wykład]	zaliczenie z ocen		
Basic reading	Chelmiński W. (2002): Woda. Zasoby, degradacja, ochrona, PWN, Warszawa				
	Turoboyski L. (1979): Hydrobiologia techniczna, PWN, Warszawa				

Supplementary reading	Allan J. D. (1998): Ekologia wód płyn cych, PWN, Warszawa
	Dojlido J. R. (1995): Chemia wód powierzchniowych, Wyd. Ekonomia i rodowisko, Białystok
	Kajak Z. (1998): Hydrobiologia i limnologia. Ekosystemy wód ródl dowych, PWN, Warszawa
	Lampert W. Sommer U. (1996): Ekologia wód ródl dowych, PWN, Warszawa

STUDENT WORKLOAD

	No. of hours	
		including e-learning
Contact hours	30	0
Participation in test / exam	2	0
Preparation for contact hours	5	0
Private reading and studying	10	0
Participation in tutorials	8	0
Preparation of project / essay / etc.	0	0
Preparation for test / exam	20	0
TOTAL workload	75	
ECTS credits	3	

COURSES YLLABUS AND SPECIFICATION

Curriculum title: USSPR-OiiŚP-O-II-S-26/27Z						
Course title: Anthropogenic transformations of plant cover (KIERUNKOWE)					Course code: US119AIJ2456_15S	
Name of field of study: ochrona i inżynieria środowiska przyrodniczego						
Mode and cycle of study: Master degree study, full - time		Profile of study: general academic			Specialty:	
Course / module status obligatory				Language of instruction: semester: 2 - English language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
1	2	discussion classes	15	0	pg	4
		lecture	15	0	pg	
Total			30			4
Course / module coordinator		dr hab. MONIKA MYŚLIWY				
Course instructor		dr hab. MONIKA MYŚLIWY				
Course / module objectives		Acquainting students with the effects of anthropopressure at various levels of the biosphere organization, as well as methods of assessing human impact on nature and ways of counteracting synanthropisation. Acquiring the ability to recognize selected species of synanthropic plants and to assess anthropogenic changes in the flora. Shaping readiness to inspire actions for the protection of biodiversity.				
Prerequisites		Basic knowledge of plant world diversity and ecology.				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	The student knows the manifestations of synanthropization at different levels of organization of the biosphere, lists examples of synanthropic plants.	K_W01 K_W02		
	2	EP2	The student describes the impact of humans on nature, knows the methods of assessing this impact and indicates ways to counteracting synanthropization.	K_W02 K_W04 K_W05		
skills	1	EP3	The student is able to observe and identify diagnostic features, to determine selected plant species with the keys, using specialized terminology.	K_U01		
	2	EP4	The student independently formulates research problems in the field of conservation and engineering of the natural environment, uses learned indicators to assess anthropogenic changes in the flora. The student is able to perform and interpret the analysis of the geographic-historical spectrum, habitat and life forms of species. The student is able to propose measures for conservation of natural resources.	K_U03 K_U07 K_U10		
	3	EP5	The student uses scientific literature and electronic sources to develop the assigned problem. The student uses specialized terminology when presenting the project.	K_U01 K_U02		

social competences	1	EP6	The student shows concern for the preservation of biodiversity and is ready to inspire and organize activities in this regard and is aware of the responsibility for actions and decisions.	K_K03 K_K04	
	2	EP7	The student is ready to recognize the importance of biological knowledge in solving problems in the field of conservation and engineering of the natural environment and is oriented to its practical use.	K_K02	
CONTENT			Semester	No. of hours	
					including e-learning
Subject title: Anthropogenic transformations of plant cover					
Format of instruction: lecture					
1. Synanthropization with regard to landscape, vegetation, flora, population and species; origin of plant species, indicators of anthropogenic changes in flora.			2	3	0
2. The impact of economic use of forests on vegetation, stages of neophytism, degeneration of phytocoenoses. Differentiators of pro-ecological forestry; anti-synanthropization decalogue.			2	3	0
3. Human impact on plant evolution, examples of taxa hybridization due to the abolition of geographic and ecological barriers, selection pressure, etc.			2	3	0
4. Methods of determining changes in plant cover. Characteristics of selected anthropogenic habitats; review of synanthropic plants in Poland.			2	6	0
Format of instruction: discussion classes					
1. Analysis of synanthropic flora: geographical and historical division of flora, indicators of anthropogenic changes in flora - practical exercises.			2	3	0
2. Overview of synanthropic species in the flora of Poland: characteristics, identification on the basis of diagnostic features; individual work with plant material, macro- and microscopic observations.			2	5	0
3. Analysis of the habitat spectrum and life forms of selected species of archaeophytes and kenophytes - practical exercises.			2	3	0
4. Centers of origin of cultivated plants, examples of anthropogenic changes in ranges - student projects.			2	4	0
Modes of delivery	<p>Lecture: informative lecture with multimedia presentation; Classes: Individual work with plant material using microscopes, Group work, Preparing and presenting the project by students.</p> <p>The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.</p>				
Assessment methods				No. of learning outcome from the syllabus	
	KOŁOKWIUM			EP1,EP2,EP4	
	PROJECT			EP5,EP6,EP7	
	PRACTICAL CLASSES			EP3,EP4,EP6,EP7	
Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.					
Grading criteria	<p>In accordance with the Study Regulations, attendance at classes is compulsory. The condition for passing the classes is active participation in classes and obtaining positive grades from work sheets and the project (average of the grades obtained). The assessment of the project will take into account its completeness and factual accuracy, the ability to interpret and synthesise scientific data, the correct citation of sources and the manner of presentation. Assessment criteria: very good (5.0): passing the work sheets and project with a correctness level of 91-100%; good plus (4.5): passing the worksheets and project with a correctness level of 81-90%; good (4.0): passing the worksheets and project with a correctness level of 71-80%; satisfactory plus (3.5): passing the worksheets and project with a correctness level of 61-70%; satisfactory (3.0): passing the work cards and project with an accuracy level of 51-60%; unsatisfactory (2.0): passing the work cards and project with an accuracy level of 50% and below. The condition for passing the lectures is a positive grade on a written test (open-ended questions) covering the content of the lectures and the recommended literature. Assessment criteria: very good (5.0): passing the test with a score of 91-100%; good plus (4.5): passing the test with a score of 81-90%; good (4.0): passing the test with a score of 71-80%; satisfactory plus (3.5): passing the test with a score of 61-70%; satisfactory (3.0): passing the test with a score of 51-60%; unsatisfactory (2.0): failing the test with a score of 50% or below. Any retakes of the test will take place during consultations within two weeks.</p>				
	Grade calculation principles				
	The final grade for the course is calculated based on the average of the grades from classes and lectures in a 1:1 ratio.				

	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
Final grade calculation method	2	Anthropogenic transformations of plant cover		arithmetic	
	2	Anthropogenic transformations of plant cover	pg		
	2	Anthropogenic transformations of plant cover	pg		
Basic reading	Fudali E. (2009): Antropogeniczne zmiany w ekosystemach. Transformacje roślinności., Wyd. Uniw. Przyr. we Wrocławiu, Wrocław.				
	Reyes O. (2022): Ecological forestry in Europe. How sound forest management can help to preserve and restore nature. Final Report. The Greens/EFA in the European Parliament, https://www.greens-efa.eu/files/assets/docs/20221007_thegreens_ecological_forestry_in_europe_web.pdf , online				
	Sushma Naithani (2021): History and Science of Cultivated Plants., https://open.oregonstate.edu/cultivatedplants/chapter/cropplants/ .				
Supplementary reading	Myśliwy M. (2014): Habitat preferences of some neophytes, with a reference to habitat disturbances., Polish Journal of Ecology 63: 509-524.				
	Myśliwy M. (2008): Vascular plants of forest dividing-lines, analyzed in respect of forest complex synanthropisation., Biodiversity Research and Conservation 9-10: 63-72.				
	Sudnik-Wójcikowska B. (2023): Flora Polski. Rośliny synantropijne., Multico Oficyna Wydawnicza, Warszawa.				
	Wójcik J. (2020): Antropogeniczne zmiany środowiska przyrodniczego Ziemi, Wydawnictwo Naukowe PWN, Warszawa				

STUDENT WORKLOAD

	No. of hours	
		including e-learning
Contact hours	30	0
Participation in test / exam	2	0
Preparation for contact hours	5	0
Private reading and studying	15	0
Participation in tutorials	18	0
Preparation of project / essay / etc.	15	0
Preparation for test / exam	15	0
TOTAL workload	100	
ECTS credits	4	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR Biotech-O-I-S-24/25Z							
Unit: Moduł I A [moduł]							
Course title: Basic histology for animal cell culture (KIERUNKOWE)					Course code: SPR34AIJ3450_37S		
Name of field of study: biotechnology							
Mode and cycle of study: first-degree, full - time		Profile of study: general academic			Specialty:		
Course / module status elective				Language of instruction: semester: 3 - English language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS	
				including e-learning			
2	3	laboratory	15	0	pg	4	
		lecture	15	0	pg		
Total			30			4	
Course / module coordinator	dr hab. KATARZYNA DZIEWULSKA						
Course instructor	dr hab. KATARZYNA DZIEWULSKA						
Course / module objectives	Provide students with knowledge of animal tissues, organs and systems construction and the use of animal cell culture in practice						
Prerequisites	Secondary school knowledge of biology						
LEARNING OUTCOMES							
Category	No.	Code	Description	Ref. to programme benchmarks			
knowledge	1	EP1	student characterizes structure of animal tissue, organs and systems	K_W01 K_W04 K_W05			
	2	EP2	student explains the relationship between structure and functions of the tissues, organs and systems and knows the environmental requirements of animal cell culture	K_W01 K_W04 K_W05			
skills	1	EP3	student indicates the use of cell, tissue and organotypic cultures in practice	K_U01 K_U02 K_U07			
	2	EP4	student conducts analysis of the microscopic image and distinguishes different types of cells and tissues under the microscope	K_U02 K_U04			
social competences	1	EP5	student is ready to learn throughout life	K_K01			
	2	EP6	student work with respect of established procedures	K_K05 K_K06			
CONTENT					Semester	No. of hours	
						including e-learning	
Subject title: histologiczne podstawy hodowli komórek zwierzęcych							
Format of instruction: lecture							
1. Introduction to cell culture. The use of cell cultures in practice. Histological technique. Animal tissue structure of a body.					3	6	0
2. Histology and function of the selected organs and systems.					3	9	0

Format of instruction: laboratory					
1. Histological technique.		3	2	0	
2. The structure, distribution and function of the epithelial, connective, blood, muscle, nerve tissues.		3	11	0	
3. Histology and function of the selected organs and systems, digestive system and associated glands		3	2	0	
Modes of delivery	multimedia presentation, individual observation under a microscope				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOLOKWIUM			EP1,EP2,EP3,EP5	
	TEST			EP1,EP2,EP3,EP5	
	PRACTICAL CLASSES			EP3,EP4,EP6	
Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.					
Grading criteria	completion of lectures: final written test - covering knowledge of program content				
	completion of exercises: practical classes and oral and written tests				
	Grade calculation principles				
a final evaluation is the arithmetic mean of lectures and practical classes in the ratio of 1: 1					
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	histologiczne podstawy hodowli komórek zwierzęcych		Arytmetyczna	
	3	histologiczne podstawy hodowli komórek zwierzęcych [laboratorium]	zaliczenie z oceną		
	3	histologiczne podstawy hodowli komórek zwierzęcych [wykład]	zaliczenie z oceną		
Basic reading	Cichocki T., Litwin J., Mirecka M. (2021): Kompendium histologii, Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków				
	Sawicki W., Malejczyk J. (2021): Histologia, PWN, Warszawa				
	Stokłosa S. (2016): Hodowle komórek i tkanek, PWN, Warszawa				
Supplementary reading	Mescher A.L (2021): Junqueira's Basic Histology: text and atlas, McGraw Hill, New York, London				
STUDENT WORKLOAD					
		No. of hours			
		including e-learning			
Contact hours	30		0		
Participation in test / exam	3		0		
Preparation for contact hours	20		0		
Private reading and studying	20		0		
Participation in tutorials	7		0		
Preparation of project / essay / etc.	0		0		
Preparation for test / exam	20		0		

TOTAL workload	100
ECTS credits	4

COURSES YLLABUS AND SPECIFICATION

Curriculum title: USSPR- Mik-O-II-S-26/27Z						
Course title: Bioinformatics of microbiomes from various environments (KIERUNKOWE)					Course code: SPR93AIJ3450_7S	
Name of field of study: mikrobiologia						
Mode and cycle of study: second degree, full - time			Profile of study: general academic		Specialty:	
Course / module status obligatory				Language of instruction: semester: 2 - English language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
1	2	discussion classes	25	0	pg	2
Total			25			2
Course / module coordinator	dr DANUTA CEMBROWSKA-LECH					
Course instructor	dr DANUTA CEMBROWSKA-LECH					
Course / module objectives	<p>The aim of the course is to provide students with structured knowledge in the field of bioinformatic analysis of microbiome data derived from various environments (living organisms, soil, water, technical environments), including an understanding of the principles of 16S rRNA sequencing and shotgun metagenomics, the basics of phylogenetic analysis, methods of gene annotation, and the interpretation of taxonomic and functional analysis results.</p> <p>The aim of the course is to develop the ability to independently perform basic bioinformatic analyses of microbiome data, including the preparation of sequencing data, use of dedicated tools and analytical pipelines, analysis of microbial diversity, interpretation of results, and critical assessment of the quality and limitations of the obtained outcomes.</p> <p>The aim of the course is to develop competencies in teamwork within a laboratory environment, responsibility for assigned analytical tasks, the ability to communicate analysis results, and an awareness of the need for continuous knowledge updates in the rapidly evolving field of microbiome bioinformatics.</p>					
Prerequisites	Basic knowledge of bioinformatics, molecular biology and microbiology.					
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	the student knows the basic types of data and their structures	K_W05		
	2	EP2	the student knows the variety of types of biological data and the formats in which they are saved	K_W05 K_W11 K_W12		
	3	EP3	the student knows selected issues of data analysis in metagenomics	K_W11 K_W12		
skills	1	EP4	the student is able to use regular expressions to edit and process text data	K_U03 K_U06		
	2	EP5	the student is able to perform advanced numerical analysis of biological data and interpret the results	K_U03 K_U05		
	3	EP6	the student is able to perform complex data analysis and skillfully select appropriate algorithms for this purpose	K_U05		
social competences	1	EP7	the student is ready to work independently and in a team to complete the given task and present the obtained solutions	K_K01 K_K05		
	2	EP8	the student is ready to independently expand and deepen his knowledge in the field of advanced biological data analysis techniques	K_K01 K_K02		
CONTENT					Semester	No. of hours
						including e-

Subject title: Bioinformatics of microbiomes from various environments					
Format of instruction: discussion classes					
1. Introduction to bioinformatics in microbiology		2	5	0	
2. DNA sequence assembly and annotation of genes		2	5	0	
3. Introduction to phylogenetic analysis of molecular sequence data		2	5	0	
4. Metagenomics data analysis: 16S rRNA amplicon sequencing		2	5	0	
5. Data analysis in metagenomics: shotgun DNA sequencing		2	5	0	
Modes of delivery	The following methods are used in the teaching process: Expository methods (short instructions and theoretical introductions before individual laboratory exercises, multimedia presentations discussing the stages of analysis the bioinformatics tools used); Practical methods (performing bioinformatic analyses on real microbiome datasets?16S rRNA and shotgun metagenomes; working with tools for sequence assembly, gene annotation, phylogenetic analysis, and taxonomic and functional classification); Problem-solving methods (solving analytical tasks related to method selection, result interpretation, and identification of potential sources of error in data analysis); Activating methods (working in small teams on shared data analysis, discussing results, and comparing outcomes obtained using different analytical methods).				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOŁOKWIUM			EP1,EP2,EP3,EP4,E P5,EP6	
	TEST			EP1,EP2,EP3,EP4,E P5,EP6	
	PRACTICAL CLASSES			EP5,EP6,EP7,EP8	
Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.					
Grading criteria	Condition for passing the course is obtaining a positive grade from the laboratory classes, which include:				
	1) Test The test includes open-ended and closed questions, as well as practical tasks related to the interpretation of analysis results. Grading scale: Very good: 91?100% Good plus: 81?90% Good: 71?80% Satisfactory plus: 61?70% Satisfactory: 51?60% Unsatisfactory: 0?50% Obtaining a passing grade is a necessary condition for completing the course.				
	2) Quiz The quizzes consist of single-choice tests and open-ended questions. Obtaining a passing grade in each quiz is essential to pass the course.				
3) Evaluation of activity and performance during practical classes Assessment includes: class attendance (mandatory), engagement and activity during analyses, accuracy and reliability in performing tasks, ability to interpret results, and documentation of work. In the case of an unexcused absence, the student is required to make up the class at an agreed time.					
Grade calculation principles					
The final course grade is determined by the grade received for the laboratory component.					
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	2	Bioinformatics of microbiomes from various environments		Weight	
	2	Bioinformatics of microbiomes from various environments]	pg		1,00
Basic reading	Błaszczak A., Frelik G. (2020): Wprowadzenie do bioinformatyki, PWN, Warszawa				

Supplementary reading	Basant K. Tiwary (2022): Bioinformatics and Computational Biology. A Primer for Biologists, Springer Singapore, Singapore
	Ramsden J. (2023): Bioinformatics, Springer Cham, Switzerland

STUDENT WORKLOAD

	No. of hours	
		including e-learning
Contact hours	25	0
Participation in test / exam	2	0
Preparation for contact hours	10	0
Private reading and studying	5	0
Participation in tutorials	3	0
Preparation of project / essay / etc.	0	0
Preparation for test / exam	5	0
TOTAL workload	50	
ECTS credits	2	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-Mik-O-I-S-25/26Z						
Course title: general immunology				Course code: SPR93AIJ3450_13S		
Name of field of study: microbiology						
Mode and cycle of study: first-degree, full - time		Profile of study: general academic		Specialty:		
Course / module status obligatory			Language of instruction: English language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	laboratory	40	0	pg	5
		lecture	30	0	e	
Total			70			5
Course / module coordinator		dr hab. Paulina Niedźwiedzka-Rystwej, prof US				
Course instructor		dr Rafał Hrynkiewicz , dr hab. Paulina Niedźwiedzka-Rystwej, prof US				
Course / module objectives		<p>Familiarize students with the body's defense mechanisms in response to antigen contact. Explain defensive responses to bacteria, viruses, and fungi. Presentation of knowledge about allergic reactions and the processes leading to immunological diseases. Introduction to the role of the immune system in maintaining the body's homeostasis. Development of skills in the practical application of immunological methods – classical methods and methods using molecular biology and rapid diagnostic tests. Development of skills in analyzing antigen-antibody reaction interactions and interpreting obtained results. Preparation for teamwork in the laboratory and research tasks. Preparation for solving dilemmas in the field of immunological research based on current knowledge and continuous expansion of this knowledge.</p>				
Prerequisites		Basic knowledge of cell biology, biochemistry, microbiology and general knowledge of the physiological processes of the human body				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	The student knows the structure and functions of the organs and cells of the immune system, and understands the importance of the microbiome for the proper functioning of the immune system.	K_W01 K_W02		
	2	EP2	The student understands the mechanisms of specific and non-specific immunity, including innate and acquired immunity, and their importance in protecting the body against pathogens	K_W01 K_W02 K_W05 K_W14		
	3	EP3	The student has knowledge about the antigen pathway in the immune system, the mechanisms of allergy and the causes and effects of autoimmunity and immunological diseases.	K_W01 K_W02 K_W05 K_W06		
	4	EP4	The student knows modern methods of analysis in molecular immunology, including technologies used to study antigens and antibodies.	K_W11 K_W12 K_W13		

skills	1	EP5	The student is able to analyze the structure and functions of immune system cells, including distinguishing their roles in innate and acquired responses.	K_U02 K_U04 K_U05	
	2	EP6	The student is able to practically carry out experiments related to cellular and humoral immunity, both in the innate and adaptive response.	K_U02 K_U03 K_U04 K_U05 K_U11	
	3	EP7	The student is able to perform laboratory analyses of antigen and antibody interactions and interpret the obtained results.	K_U02 K_U03 K_U04 K_U05 K_U09	
	4	EP8	The student effectively applies modern immunological methods in scientific and diagnostic research, in particular in molecular immunology.	K_U02 K_U03 K_U04 K_U05 K_U11	
	5	EP9	The student is able to work in a team, communicating effectively and collaborating while carrying out laboratory tasks.	K_U17	
social competences	1	EP10	The student demonstrates awareness of the need to continuously expand knowledge in the field of immunology and develop practical skills in this field.	K_K01 K_K02	
	2	EP11	The student demonstrates responsibility for the reliability and accuracy of laboratory tests, ensuring their compliance with the principles of scientific ethics.	K_K08 K_K09	
	3	EP12	The student understands the importance of health education in the context of popularizing knowledge about the immune system and its role in health	K_K04 K_K06	
CONTENT			Semester	No. of hours	
					including e-learning
Subject title: general immunology					
Format of instruction: lecture					
1. The structure and function of organs and cells of the immune system (IS). The microbiome and IS			3	10	0
2. Mechanisms of specific and non-specific immunity (innate and acquired immunity)			3	15	0
3. The antigen pathway in IS and allergic reactions. Autoimmunity and immunological diseases.			3	5	0
Format of instruction: laboratory					
1. Introduction to the exercises: discussion of the course topics, passing criteria, recommended literature, and occupational health and safety regulations in the immunology laboratory.			3	1	0
2. The structure and functions of immune system cells			3	5	0
3. Innate immunity part I - cellular immunity			3	5	0
4. Innate immunity part II - humoral immunity			3	10	0
5. Acquired immunity part I - cellular immunity			3	3	0
6. Acquired immunity part II - humoral immunity			3	3	0
7. Antigens and antibodies			3	3	0
8. Modern analysis methods in molecular immunology			3	10	0
Modes of delivery	performing laboratory analyses [laboratory], discussion [laboratory], performing experiments [laboratory], demonstration [laboratory], practical classes [laboratory], lecture with multimedia presentation [lecture]				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				

Assessment methods					No. of learning outcome from the syllabus
	WRITTEN EXAM				EP1,EP2,EP3,EP4
	KOŁOKWIUM				EP1,EP2,EP3,EP4
	TEST				EP1,EP2,EP3,EP4
	ESSAY/ REVIEW				EP11,EP5,EP6,EP7
	PRACTICAL CLASSES				EP10,EP11,EP12,EP6,EP7,EP8,EP9
Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.					
Grading criteria	<p>Lecture: Written examination in the form of a longer written presentation based on the questions presented during lectures.</p> <p>Laboratory: The final grade for the laboratory classes will be determined based on partial grades earned during the semester, including: class participation, test scores, quality of the laboratory experiments performed, reports on the experiments conducted, and a written test assessing knowledge gained during the laboratory exercises and included in the available literature.</p>				
	Grade calculation principles				
	The final grade is calculated based on the grade from the exam and the exercises in a 2:1 ratio.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	general immunology		Weighted	
	3	general immunology [lecture]	exam		0,67
	3	general immunology [laboratory]	pg		0,33
Basic reading	Abbas. A.K.; Lichtman, A.H.; Pillai S. (2021): Immunologia. Funkcje i zaburzenia układu immunologicznego, Urban & Partner, Wrocław				
	Bryniarski, K.; Siedlar, M. (2023): Immunologia, Edra Urban & Partner, Wrocław				
	Gołab, J.; Jakóbisiak, M.; Lasek, W.; Stokłosa T. (2023): Immunologia, Wydawnictwo naukowe PWN, Warszawa				
Supplementary reading	Buczek, J.; Deptuła, W.; Gliński, Z.; Jarosz, J.; Stosik, M.; Wernicki A. (2000): Immunologia porównawcza i rozwojowa zwierząt, Wydawnictwo Naukowe PWN, Warszawa				
	Deptuła, W.; Tokarz-Deptuła, B.; Pisarski R. (2014): Immunologia - fakty znane i nieznanne, Wyd. PWSZ., Legnica				
	Deptuła, W.; Tokarz-Deptuła, B.; Stosik M. (2009): Immunologia dla biologów - wydanie nowe, Wyd. US, Szczecin				
	Żeromski, J.; Madaliński, K.; Witkowski, J.M. (2017): Diagnostyka immunologiczna w praktyce lekarskiej, Mediton, Łódź				
	(2023): Czasopisma: Alergia, Astma, Immunologia, Kosmos, Postępy Biochemii, Postępy Biologii Komórki, Postępy Higieny i Medycyny Doświadczalnej, Advancements of Microbiology - Postępy Mikrobiologii, Wszechświat				
STUDENT WORKLOAD					
			No. of hours		
			including e-learning		
Contact hours	70		0		
Participation in test / exam	4		0		
Preparation for contact hours	6		0		
Private reading and studying	12		0		
Participation in tutorials	6		0		
Preparation of project / essay / etc.	7		0		
Preparation for test / exam	20		0		

TOTAL workload	125
ECTS credits	5

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-GiBE-O-I-S-26/27Z							
Course title: histologia (PODSTAWOWE)			Course code: SPR85AIJ3450_18S				
Name of field of study: genetyka i biologia eksperymentalna							
Mode and cycle of study: first-degree, full - time		Profile of study: general academic		Specialty:			
Course / module status obligatory			Language of instruction: semester: 2 - polish language				
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS	
				including e-learning			
1	2	laboratory	30	0	pg	4	
		lecture	20	0	pg		
Total			50			4	
Course / module coordinator		dr LUCYNA KIRCZUK					
Course instructor		dr LUCYNA KIRCZUK					
Course / module objectives		Acquiring knowledge of the basic structural characteristics of animal tissues, organs, and systems. Familiarization with equipment for preparing histological preparations. Developing the ability to independently interpret histological images. Demonstrating the importance of histological knowledge in health education.					
Prerequisites		Knowledge of high school biology					
LEARNING OUTCOMES							
Category	No.	Code	Description	Ref. to programme benchmarks			
knowledge	1	EP1	the student characterizes the structure of individual tissues and organs	K_W01 K_W16			
	2	EP2	the student explains the connections between the structure of tissues and organs and their functions	K_W01 K_W16			
skills	1	EP3	the student is able to distinguish different types of tissues under a microscope	K_U03 K_U11			
	2	EP4	the student analyzes the adaptation of organ structure to the function performed and the interaction of tissues and organs	K_U03 K_U11			
social competences	1	EP5	The student is ready to independently analyze histological preparations.	K_K01 K_K02 K_K04			
	2	EP6	The student follows established procedures when performing work.	K_K01 K_K05 K_K07			
CONTENT					Semester	No. of hours	
						including e-learning	
Subject title: histologia							
Format of instruction: lecture							
1. Adaptation of the structure of animal cells to their function in epithelial, connective, muscle, blood and nervous tissues					2	8	0
2. Structure and function of body systems and organs (digestive system, digestive glands, endocrine system, lymphatic system, circulatory system, respiratory system, urinary system, reproductive system)					2	12	0
Format of instruction: laboratory							
1. Introduction to the procedure for preparing a microscopic preparation.					2	2	0

2. Epithelial tissue, connective tissue, muscle tissue, blood, nervous tissue		2	14	0	
3. Histological structure and function of the following systems: endocrine, digestive, circulatory, respiratory, urinary, lymphatic, reproductive.		2	14	0	
Modes of delivery	individual work in the laboratory, individual work with a microscope and analysis of the microscopic image, multimedia presentation				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOLOKWIUM			EP1,EP2,EP4	
	SPRAWDZIAN			EP1,EP2	
	ZAJ CIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJ)			EP1,EP2,EP3,EP4,EP5,EP6	
	Metody i formy weryfikacji efektów uczenia si mog zosta zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach okre lonych w Regulaminie Studiów Uniwersytetu Szczeci skiego.				
Grading criteria	Lecture assessment: written assessment covers knowledge from the lectures and recommended reading - open-ended questions Laboratory assessment: based on partial tests (written - open-ended questions) on each topic, tests - open-ended questions, active participation in classes, and correctly completed drawings in the subject notebook				
	Grade calculation principles				
	the final grade is the arithmetic average of the grades from lectures and laboratories				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	2	histologia		Arytmetyczna	
	2	histologia [wykład]	zaliczenie z ocen		
	2	histologia [laboratorium]	zaliczenie z ocen		
Basic reading	Cichocki T., Litwin J., Mirecka J. (2023): Kompendium histologii, Wydawnictwo UJ, Kraków				
	Sawicki W., Mirecka M. (2023): Histologia, PZWL, Warszawa				
Supplementary reading	Litwin J.A. (2004): Technika histologiczna, UJ, Kraków				
	Zabel M. (2021): Histologi, Edra Urban & Partner, Wrocław				
STUDENT WORKLOAD					
		No. of hours			
		including e-learning			
Contact hours	50		0		
Participation in test / exam	1		0		
Preparation for contact hours	34		0		
Private reading and studying	2		0		
Participation in tutorials	2		0		
Preparation of project / essay / etc.	0		0		
Preparation for test / exam	11		0		
TOTAL workload	100				
ECTS credits	4				

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-Biotech-O-I-S-24/25Z							
Course title: In vitro culture of plant (roślinne kultury in vitro) (KIERUNKOWE)					Course code: SPR34AIB450_34S		
Name of field of study: biotechnology							
Mode and cycle of study: first-degree, full - time			Profile of study: general academic		Specialty:		
Course/module status obligatory				Language of instruction: English language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS	
				w tym e-learning			
3	6	laboratory	45	0	pg	3	
		lecture	15	0	e		
Total			60			3	
Course / module coordinator		dr Anna Kujawska					
Course instructor		dr Anna Kujawska					
Course / module objectives		Familiarizing students with different types of cultures and techniques of in vitro work. Acquisition of practical skills in sterile work with plant material and plant propagation in vitro.					
Prerequisites		Basic knowledge of Plant Embryology, Plant Physiology, Biochemistry, Microbiology.					
LEARNING OUTCOMES							
Category	No.	Code	Description	Ref. to programme benchmarks			
knowledge	1	EP1	the student understands the basic phenomena and processes in the field of in vitro plant cultures	K_W02			
	2	EP2	the student has knowledge of the basic techniques used in plant in vitro cultures	K_W11			
	3	EP3	the student knows Polish companies that produce plants in vitro	K_W15 K_W16			
skills	1	EP4	the student is able to perform calculations necessary for the preparation of culture media	K_U03 K_U08			
	2	EP5	the student is able to draw conclusions based on the obtained experimental results	K_U02 K_U03 K_U04 K_U09			
	3	EP6	the student is able to use the available laboratory equipment to prepare and conduct experiments	K_U01			
	4	EP7	the student is able to prepare a report on the conducted experiments in the form of a report	K_U15			
	5	EP8	the student is able to interact and work in a group, assuming different roles in it	K_U16			
social competences	1	EP9	The student acquires the competence to comply with the health and safety rules while working in the laboratory	K_K05			
CONTENT					Semester	No. of hours	
							w tym e-learning
Subject title: In vitro culture of plant							
Format of instruction: lecture							

1. In vitro cultures in basic research and agriculture.		5	2	0	
2. Principles of using in vitro culture techniques.		5	2	0	
3. Culture types.		5	2	0	
4. Direct and indirect organogenesis.		5	2	0	
5. Somatic embryogenesis.		5	2	0	
6. Plant micropropagation.		5	2	0	
7. Releasing plants from viruses.		5	2	0	
8. Gynogenesis and androgenesis.		5	1	0	
Format of instruction: laboratory					
1. Mathematical calculations related to the preparation of media		5	5	0	
2. Preparation of culture media		5	6	0	
3. Surface sterilization of plant material		5	4	0	
4. Cultures of isolated organs		5	5	0	
5. Callus cultures of selected plant species		5	6	0	
6. Induction of organogenesis on the example of selected plant species		5	6	0	
7. Micropropagation of selected plant species		5	9	0	
8. Acclimatization of selected plant species		5	4	0	
Modes of delivery	multimedia presentation work in groups performing experiments solving tasks				
Assessment methods				No. of learning outcome from the syllabus	
	WRITTEN EXAM			EP1,EP3	
	KOLOKWIUM			EP2,EP4,EP5	
	ESSAY			EP5,EP7	
PRACTICAL CLASSES			EP6,EP8,EP9		
Grading criteria	Lectures: Written exam to check the knowledge acquired during the lectures (longer written statement) Exercises: Determining the final grade on the basis of partial grades received during the semester for the colloquium, report, as well as on the basis of the student's activity in classes The final grade is the average of grades from lectures and exercises in the ratio of 2:1				
	Grade calculation principles				
	The final grade of the course coordinator is 33% of the grade for laboratory exercises and 67% of the grade for lectures.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	5	In vitro culture of plant		weight	
	5	In vitro culture of plant [lecture]	exam		0,33
	5	In vitro culture of plant [laboratory]	pg		0,67

Basic reading	Bowes B. (1999): Plant Propagation and conservation, Manson Publishing, UK (dostępna w Katedrze Biotechnologii Roślin)	
	George E.F. (2007): Plant Propagation by Tissue Culture: Vol1, Rozdział 9, Springer (dostępna w Katedrze Biotechnologii Roślin)	
	Avinash Chandra Rai, Ajay Kumar, Arpan Modi, Major Singh (2022): Advances in Plant Tissue Culture, Elsevier Inc.	
Supplementary reading	Biotechnologia - Computational Biology and Bionanotechnology, Kwartalnik (wybrane numery)	
	Articles from international scientific journals	
STUDENT WORKLOAD		
	No. of hours	
		W tym e-learning
Contact hours	60	0
Participation in test / exam	2	0
Preparation for contact hours	3	0
Private reading and studying	2	0
Participation in tutorials	2	0
Preparation of project / essay / etc.	2	0
Preparation for test / exam	4	0
TOTAL workload	75	
ECTS credits	3	

COURSES YLLABUS AND SPECIFICATION

Curriculum title: USSPR-GiBE-O-I-S-25/26Z							
Unit: Module							
Course title: Introduction to plant taxonomy					Course code: SPR85AIJ3446_2S		
Name of field of study: genetyka i biologia eksperymentalna							
Mode and cycle of study: first-degree, full - time			Profile of study: general academic		Specialty:		
Course / module status elective				Language of instruction: semester: 3 - English language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS	
				including e-learning			
2	3	laboratory	20	0	pg	3	
		lecture	16	0	pg		
Total			36			3	
Course / module coordinator		dr hab. HELENA WIĘCŁAW					
Course instructor		dr hab. HELENA WIĘCŁAW					
Course / module objectives		Introduction to the taxonomic concepts, research methods and plant diversity Gaining the ability to recognize plant taxa using specialized keys					
Prerequisites		Basic knowledge of biology at the high school level					
LEARNING OUTCOMES							
Category	No.	Code	Description	Ref. to programme benchmarks			
knowledge	1	EP1	The student knows and understands the definitions and is able to characterize biological, chemical and physical processes	K_W01 K_W05			
	2	EP2	The student knows the research methods used in plant taxonomy and knows how to use them	K_W07			
skills	1	EP3	The student is able to find in the literature and correctly apply information on plant taxonomy	K_U01 K_U02			
	2	EP4	The student is able to apply statistical methods used in plant taxonomy; can identify plant species using a special key	K_U05			
social competences	1	EP5	The student is aware of his knowledge and the need to deepen it	K_K01			
	2	EP6	The student is creative and uses his knowledge in the implementation of the task entrusted to him	K_K04			
CONTENT					Semester		
					No. of hours		
					including e-learning		
Subject title: wprowadzenie do taksonomii roślin							
Format of instruction: lecture							
1. Introduction to plant taxonomy: purpose, basic concepts and sources of taxonomic information.					3	2	0
2. Principles and methods used in classical plant taxonomy. Nomenclature, taxonomic ranks, species concept, phenetic taxonomy.					3	8	0
3. Phylogenetic taxonomy and methods used in phylogenetic analysis. Basic differences between Linear and phylogenetic taxonomy.					3	4	0
4. A modern, updated classification system for angiosperms - the APG system.					3	2	0

Format of instruction: laboratory					
1. Algae as a polyphyletic taxon. Overview of selected taxonomic groups.			3	2	0
2. Taxonomic diversity and characteristics of bryophytes. Identification of plant materials based on micro- and macroscopic features			3	2	0
3. Taxonomic review of clubmoss, horsetails and ferns. Identification of plant materials based on micro- and macroscopic features.			3	2	0
4. Classification, taxonomic diversity and characteristics of seed plants. Identification of plant materials based on micro- and macroscopic features.			3	14	0
Modes of delivery	individual and group work with plant material (microscope, binocular, magnifier) and keys for plant identification, observation, multimedia presentation				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods					No. of learning outcome from the syllabus
	KOLOKWIUM				EP1,EP2
	TEST				EP1,EP2,EP3
	PRACTICAL CLASSES				EP3,EP4,EP5,EP6
Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.					
Grading criteria	Lectures are passed on the basis of a written test, during which knowledge from lectures and recommended literature is checked. Laboratory classes are passed on the basis of attendance, active work in class and partial tests.				
	Grade calculation principles				
	The final grade of the course is calculated as the arithmetic average of the grades from lectures and laboratory classes.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	Introduction to plant taxonomy		arithmetic	
	3	Introduction to plant taxonomy [lecture]	pg		
	3	Introduction to plant taxonomy [laboratory]	pg		
Basic reading	Ackles E. (2020): Botany: Plant Identification and Classification. , CALLISTO REFERENCE				
	Rutkowski L. (2020): Klucz do oznaczania roślin naczyniowych Polski niżowej, Wydawnictwo Naukowe PWN, Warszawa				
	Simpson M. G. (2019): Plant Systematics, Academic Press, Elsevier.				
	Stace C. A. (1993): Taksonomia roślin i biosystematyka, PWN, Warszawa				
	Szwejkowska A., Szwejkowski J. (2022): Botanika Tom II, Wydawnictwo Naukowe PWN, Warszawa				
Supplementary reading	Mitka J. (2004): Taksonomia lineuszowska w dobie biologii molekularnej, Fragm. Florist. et Geobot. Polonica , Kraków				
	Stevens P. F. (2017): Angiosperm Phylogeny Website. Version 14, http://www.mobot.org/MOBOT/research/APweb/ - aktualizowana				
	Stuessy T. F. (2009): Plant Taxonomy. The systematic evaluation of comparative data, Columbia University Press, New York				

STUDENT WORKLOAD

	No. of hours	
		including e-learning
Contact hours	36	0
Participation in test / exam	1	0
Preparation for contact hours	10	0
Private reading and studying	13	0

Participation in tutorials	2	0
Preparation of project / essay / etc.	0	0
Preparation for test / exam	13	0
TOTAL workload	75	
ECTS credits	3	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-GiBE-O-I-S-24/25Z**

Unit:
Module

Course title:
Molecular methods in taxonomic and population studies

Course code:
SPR85AIJ3446_51S

Name of field of study:
genetics and experimental biology

Mode and cycle of study:
first-degree, full - time

Profile of study:
general academic

Specialty:

Course / module status
elective

Language of instruction:
English language

Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
3	5	laboratory	15	0	pg	2
		lecture	15	0	pg	
Total			30			2

Course / module coordinator
prof. dr hab. ANDRZEJ ZAWAL

Course instructor
dr inż. Jakub Skorupski

Course / module objectives
Classification of organisms based on molecular data, determination of intra-population relationships and ecological characteristics, methods of presenting the results of population and phylogeographic studies.

Prerequisites
Basic knowledge of animal taxonomy, genetics, molecular biology.

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge		EP1	The student knows the principles and definitions of intra-population	K_W01 K_W04
	2	EP2	The student knows the types of molecular markers and their use in population and phylogeographic studies.	K_W02 K_W05 K_W06
skills	1	EP3	The student can use various data to determine relationships within and between populations.	K_U01 K_U02 K_U03 K_U05
	2	EP4	The student is able to interpret molecular data to solve phylogeographic and population problems.	K_U05 K_U07 K_U08
social competences	1	EP5	The student works in a team to perform and interpret phylogeographic and population research results.	K_K01 K_K02 K_K03 K_K04

CONTENT	Semester	No. of hours	
			including e-learning

Subject title: **Molecular methods in taxonomic and population studies**

Format of instruction: **lecture**

1. An overview of molecular techniques used in taxonomic and population studies	5	5	0
2. Taxonomic value of genetic traits at different levels of classification of organisms.	5	5	0
3. Phylogeography, dispersion and specialization.	5	5	0

Format of instruction: laboratory					
1. Comparing and aligning biomolecule sequences		5	1	0	
2. The use of molecular methods to determine the species composition of habitats		5	3	0	
3. The use of molecular methods to determine the ranges of population occurrence		5	3	0	
4. Using molecular methods to track migration routes		5	4	0	
5. Use of molecular methods for phylogeographic analyses.		5	4	0	
Modes of delivery	multimedia presentation, computer work, group work				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	KOŁOKWIUM			EP1,EP2,EP4	
	PRACTICAL CLASSES			EP1,EP2,EP3,EP4,EP5	
Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.					
Grading criteria	Passing grade: 1) written test covering knowledge from lectures 2) passing grade for laboratory exercises based on attendance, active participation, and a written test covering knowledge from laboratory exercises.				
	Grade calculation principles				
	The final grade of the course coordinator is calculated on the basis of the grade from the test covering the lecture content and the final grade from the laboratory exercises in a 1:1 ratio.				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	5	Molecular methods in taxonomic and population studies		arithmetic	
	5	Molecular methods in taxonomic and population studies [laboratory]	pg		
	5	Molecular methods in taxonomic and population studies [lecture]	pg		
Basic reading	Avisé J. C. (2004): Markery molekularne, historia naturalna i ewolucja., WUW				
	Freeland J. R. (2008): Ekologia molekularna., PWN, Warszawa				
Supplementary reading	Hall B. G. (2008): Łatwe drzewa filogenetyczne. Poradnik użytkownika., WUW				
STUDENT WORKLOAD					
		No. of hours			
			including e-learning		
Contact hours		30	0		
Participation in test / exam		2	0		
Preparation for contact hours		4	0		
Private reading and studying		5	0		
Participation in tutorials		4	0		
Preparation of project / essay / etc.		0	0		
Preparation for test / exam		5	0		

TOTAL workload	50
ECTS credits	2

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: USSPR-B-O-I-S-26/27Z						
Course title: Zoology of invertebrates (KIERUNKOWE)				Course code: SPR23AIJ3446_5S		
Name of field of study: biologia						
Mode and cycle of study: first-degree, full - time		Profile of study: general academic		Specialty:		
Course / module status obligatory			Language of instruction: semester: 2 - English language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
1	2	field classes	10	0	pg	7
		laboratory	45	0	pg	
		lecture	30	0	e	
Total			85			7
Course / module coordinator		dr TOMASZ KREPSKI				
Course instructor		dr Grzegorz Michoński , dr Aleksandra Bańkowska , dr TOMASZ KREPSKI				
Course / module objectives		Knowledge: - basic systematics and nomenclature of selected groups of invertebrates, - basics of invertebrate phylogeny, - exemplary taxa, which are representatives of the discussed systematic groups and the anatomy and morphology of these taxa, - the role of selected invertebrates in various ecosystems Working with a stereoscopic and optical microscope. Mastering the skills of obtaining invertebrates in the field and preliminary taxa identification.				
Prerequisites		lack				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP2	He knows the basics of invertebrate biology.	K_W06		
	2	EP3	Characterizes selected taxonomic groups of invertebrates, taking into account diagnostic features and their morphology, knows representatives of these groups.	K_W07		
	3	EP4	Explains the role of selected systematic groups and species in the ecosystem.	K_W08 K_W09		
skills	1	EP5	Analyzes the systematic features of selected taxa using a biological and stereoscopic microscope and dissection equipment.	K_U03 K_U06		
	2	EP6	Recognizes and classifies morphological features of selected taxa and assigns them to the appropriate systematic group.	K_U01		
	3	EP7	Evaluates the features of several invertebrates presented to him and distinguishes them from each other by giving their characteristics.	K_U08		
	4	EP8	He is able to find places of occurrence of selected taxonomic groups of invertebrates in the field.	K_U06		
	5	EP9	He knows how to use field equipment for catching invertebrates.	K_U06		
	6	EP13	Able to work in a group taking on different roles.	K_U16		

social competences	1	EP11	Has the ability to responsibly perform the entrusted tasks.	K_K02	
	2	EP12	Shows responsibility for occupational safety.	K_K07	
CONTENT			Semester	No. of hours	
					including e-learning
Subject title: zoologia bezkręgowców					
Format of instruction: lecture					
1. Principles of nomenclature and taxonomy of invertebrates			2	2	0
2. Basics of phylogeny of invertebrates			2	2	0
3. Basic types of invertebrates structure			2	16	0
4. Anatomy, morphology and physiology of selected invertebrate taxa			2	10	0
Format of instruction: laboratory					
1. Systematics of selected taxonomic groups of invertebrates.			2	15	0
2. Morphological and diagnostic features of selected taxonomic groups of invertebrates			2	10	0
3. Representatives of selected taxonomic groups			2	10	0
4. The role of selected invertebrates in the ecosystem and human life			2	10	0
Format of instruction: field classes					
1. Fieldwork observations of selected groups of invertebrates and vertebrates, identification of diagnostic features			2	4	0
2. Working with devices and equipment for conducting field research. Learning fieldwork techniques.			2	3	0
3. Learning to find selected invertebrates and vertebrates in habitats. Recognition of traces of the presence of these animals.			2	3	0
Modes of delivery	prezentacja multimedialna na podstawie autorskiego programu, oral discussion of the scope of the exercise/multimedia presentation with the discussion, practical works in the biological laboratory, microscopic observations, making drawings				
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				No. of learning outcome from the syllabus	
	WRITTEN EXAM			EP2,EP3,EP4	
	KOŁOKWIUM			EP2,EP3,EP4	
	PRACTICAL CLASSES			EP11,EP12,EP13,EP5,EP6,EP7,EP8,EP9	
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów Uniwersytetu Szczecińskiego.				
Grading criteria	Passing lectures, laboratory exercises and field exercises.				
	Grade calculation principles				
	Examination and passing on the grade of exercises, the final grade is calculated in the ratio 1:1:1 (lectures: laboratory exercises: field exercises)				
Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	2	zoologia bezkręgowców		Arytmetyczna	
	2	zoologia bezkręgowców [laboratorium]	zaliczenie z oceną		
	2	zoologia bezkręgowców [wykład]	egzamin		
	2	zoologia bezkręgowców [zajęcia terenowe]	zaliczenie z oceną		

Basic reading	Błaszak Cz. (2014): Zoologia. Bezkręgowce. Tom 1, część 1, PWN, Warszawa
	Błaszak Cz. (2014): Zoologia. Bezkręgowce. Tom 1, część 2, PWN, Warszawa
	Błaszak Cz. (2013): Zoologia. Bezkręgowce. Tom 2, część 1, PWN, Warszawa
	Błaszak Cz. (2017): Zoologia. Bezkręgowce. Tom 2, część 2, PWN, Warszawa
Supplementary reading	Sina M Adl (2022): Protistology, Elsevier - Health Sciences Division

STUDENT WORKLOAD

	No. of hours	
		including e-learning
Contact hours	85	0
Participation in test / exam	2	0
Preparation for contact hours	25	0
Private reading and studying	23	0
Participation in tutorials	15	0
Preparation of project / essay / etc.	0	0
Preparation for test / exam	25	0
TOTAL workload	175	
ECTS credits	7	

Curriculum title:						
Course title: Biotechnology in nature conservation					Course code:	
Name of field of study: Biotechnology						
Mode and cycle of study:			Profile of study: general academic		Specialty:	
Course / module status				Language of instruction: English language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	laboratory	20	0	pg	3
		lecture	10	0	e	
Total			30			3
Course / module coordinator		dr Jakub Skorupski				
Course instructor		dr Jakub Skorupski				
Course / module objectives		Familiarisation with the theoretical and practical foundations of applying biotechnology to nature conservation, with emphasis on: (i) genetic and genomic tools supporting biodiversity assessment and monitoring, (ii) ex situ and in situ conservation planning, (iii) conservation breeding and gene banking, (iv) environmental DNA (eDNA) and molecular identification, and (v) ethical, legal and socio-economic aspects of biotechnological interventions supporting biodiversity protection and ecosystem resilience.				
Prerequisites		General knowledge on ecology				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	The student explains the role of biotechnology in nature conservation and uses key terminology correctly (e.g. biodiversity monitoring, genetic diversity, population connectivity, eDNA, barcoding, conservation genomics, gene banking, conservation breeding, reintroduction).	K_W01 K_W04		
	2	EP2	The student understands how genetic and genomic processes and data inform conservation decisions (e.g. fragmentation and inbreeding risk, management units, adaptive potential, hybridisation, introgression), and recognises benefits and limitations of biotechnological methods in conservation practice.	K_W01 K_W07		
skills	1	EP3	The student applies basic molecular and bioinformatic approaches used in conservation (e.g. eDNA/barcoding workflow overview, interpretation of genetic diversity and assignment outputs, use of reference databases), and documents results with appropriate quality-control awareness.	K_U01		
social competences	1	EP4	The student is prepared to work responsibly in applied conservation biotechnology, including teamwork, transparent reporting and reproducibility, ethical handling of biological material and sensitive biodiversity data, and clear communication of results and uncertainty to non-specialists and stakeholders	K_K04		
CONTENT					No. of hours	

		Semeste		including e-learning
Subject title: Biotechnology in nature conservation				
Format of instruction: lecture				
1. Biotechnology in nature conservation: scope, terminology, conservation priorities, overview of methods and decision contexts	3	2	0	
2. Genetic diversity and extinction risk: fragmentation, inbreeding, genetic drift, adaptive potential; management units and genetic monitoring	3	3	0	
3. Molecular identification and monitoring: barcoding, metabarcoding, eDNA; reference databases and interpretation pitfalls	3	3	0	
4. Biotechnological interventions: ex situ vs in situ approaches (gene banking, cryopreservation, conservation breeding, reintroduction support, genetic rescue); ethical and legal aspects	3	2	0	
Format of instruction: laboratory				
1. eDNA and molecular monitoring in conservation: sampling design, contamination control, interpreting detection/non-detection, case examples	3	4	0	
2. Barcoding/metabarcoding in practice (introductory level): workflow, databases (e.g. BOLD/GenBank concepts), species assignment and limitations	3	4	0	
3. Conservation genetics toolbox: interpreting diversity and structure outputs (e.g. heterozygosity, F-statistics conceptually, assignment/relatedness results) using in silico exercises	3	4	0	
4. Ex situ conservation: gene banking, cryopreservation concepts, conservation breeding principles, pedigree and genetic management basics	3	4	0	
5. Applied project workshop (group work): designing a biotechnologysupported conservation plan for a selected species/habitat (monitoring + intervention + risk/ethics)	3	4	0	
Modes of delivery				
Lecture, multimedia presentation, <i>in silico</i> analyses/specialized software, work in groups, problem discussion, case study analysis				
The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.				
Assessment methods				
			No. of learning outcome from the	
Written exam			EP1, EP2,	
Verification by observation			EP3, EP4,	
Grading criteria				
Course lecture completion with a grade is based on a positive result of a written exam covering the lecture content.				
Completion of laboratory classes based on activity and completion of tasks prepared by the instructor.				
The final grade for the course is the arithmetic mean of the grades obtained in the exam and the laboratory.				
Final grade calculation method				
Arithmetic mean of grades from lectures and laboratory classes.				
Basic reading				
Frankham, Richard; Ballou, Jonathan D.; Ralls, Katherine; Eldridge, Mark D. B.; Dudash, Michele R.; Fenster, Charles B.; Lacy, Robert C.; Sunnucks, Paul. (2017). Genetic Management of Fragmented Animal and Plant Populations . Oxford: Oxford University Press				
Allendorf, Fred W.; Funk, W. Chris; Aitken, Sally N.; Byrne, Margaret; Luikart, Gordon. (2022). Conservation and the Genomics of Populations (3rd ed.) . Oxford				
Taberlet, Pierre; Bonin, Aurélie; Zinger, Lucie; Coissac, Eric. (2018). Environmental DNA: For Biodiversity Research and Monitoring . Oxford: Oxford University Press				
Supplementary reading				
Conservation Genetics (journal) Molecular Ecology (journal)				

STUDENT WORKLOAD

	No. of hours
Contact hours	30
Participation in test / exam	2
Preparation for contact hours	5
Private reading and studying	12
Participation in tutorials	11
Preparation of project / essay / etc.	0
Preparation for test / exam	15
TOTAL workload	75
ECTS credits	3

Curriculum title:						
Course title: Forensic trichology					Course code:	
Name of field of study: Biological Basis of Forensic Science						
Mode and cycle of study:			Profile of study: general academic		Specialty:	
Course / module status				Language of instruction: English language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	laboratory	15	0	pg	3
		lecture	15	0	e	
Total			30			3
Course / module coordinator		dr Jakub Skorupski				
Course instructor		dr Jakub Skorupski				
Course / module objectives		To familiarise students with the biological and forensic foundations of hair evidence, including: hair anatomy and growth, morphological and microscopic examination, human vs animal hair discrimination, evidential value and limitations of hair comparisons, sampling and contamination control, documentation and reporting, and the interface between trichology, DNA analysis and toxicology in forensic casework.				
Prerequisites		knowledge of human and animal biology				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	The student explains hair structure, development and growth cycle (anagen/catagen/telogen), and relates these biological features to the formation and variability of forensic hair characteristics	K_W01 K_W04		
	2	EP2	The student describes the principles, scope and limitations of forensic hair examination, including human vs animal hair features, sources of variation (age, body area, treatments, environment), and the appropriate evidential interpretation of findings	K_W01 K_W07		
skills	1	EP3	The student conducts an introductory microscopic examination of hair evidence using accepted laboratory practice: proper handling, mounting, observation, description of key features, and accurate documentation (notes, sketches/photomicrographs where applicable)	K_U01		
	2	EP4	The student performs a structured comparative assessment (questioned vs known samples) at an introductory level, distinguishes hair from fibres and other trace materials, and produces a clear forensic-style report using cautious, scientifically justified language.	K_U01		
social competences	1	EP5	The student is prepared to work responsibly with trace evidence, applying contamination control and chain-of-custody principles, collaborating in laboratory teams, and communicating results and uncertainty ethically and transparently in a forensic context.	K_K04		
CONTENT				Semester	No. of hours	
				r		including e-learning

Subject title: Forensic trichology			
Format of instruction: lecture			
1. Introduction to forensic trichology: role of hair evidence, evidential value, limitations, historical context and current practice standards	3	2	0
2. Hair biology for forensic interpretation: anatomy (cuticle/cortex/medulla), pigmentation, growth cycle, shedding, root morphology		3	0
3. Microscopy and morphological features: scale patterns, medullary patterns, cross-sections, diameter variation, artefacts and observer bias		3	0
4. Human vs animal hair; body-area variation; population-level variability; effects of cosmetic treatment, disease and environmental exposure		3	0
5. Hair in the broader forensic workflow: collection and preservation principles, chain of custody, reporting language, quality assurance		2	0
6. Integration with other methods: mtDNA/nuclear DNA considerations (conceptual), hair toxicology overview, casework interpretation and court-related issues			
Format of instruction: laboratory			
Laboratory safety, trace evidence handling, contamination control, packaging/labeling, and documentation templates	3	2	0
Microscopy fundamentals for hair examination: instrument setup, calibration (introductory), mounting methods, photomicrograph documentation	3	3	0
Descriptive hair morphology: systematic recording of features (cuticle/cortex/medulla), recognising common artefacts	3	3	0
Comparative examination exercise: questioned vs known samples; cautious interpretation; distinguishing hair from fibres	3	3	0
Human vs animal hair practical: identification features; medullary index concept; reference collections (introductory use)	3	2	0
Reporting workshop: writing a forensic-style report, statement of limitations, peer review of reports, and case-based discussion	3	2	0
Modes of delivery	Lecture, multimedia presentation, <i>in silico</i> analyses/specialized software, work in groups, problem discussion, case study analysis		
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.		
Assessment methods			No. of learning outcome from the
	Written exam		EP1, EP2, EP4
	Verification by observation		EP3, EP4, EP5
Grading criteria	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w Regulaminie Studiów		
	Course lecture completion with a grade is based on a positive result of a written exam covering the lecture content.		
	The final grade for the course is the arithmetic mean of the grades obtained in the exam and the laboratory.		
Final grade calculation method	The final grade for the course is calculated on the basis of the arithmetic mean of the grades from the laboratory and the exam.		
	Arithmetic mean of grades from lectures and laboratory classes.		
Basic reading	Houck, M. M., & Siegel, J. A. (2015). <i>Fundamentals of Forensic Science</i> (3rd ed.). Amsterdam: Elsevier/Academic Press		
	Tóth, M. (2017). <i>Hair and Fur Atlas of Central European Mammals</i> . Pars Ltd, Nagykovács		
Supplementary reading	Evetts, I. W., & Weir, B. S. (1998). <i>Interpreting DNA Evidence: Statistical Genetics for Forensic Scientists</i> . Sunderland, MA: Sinauer Associates		

STUDENT WORKLOAD	
	No. of hours
Contact hours	30
Participation in test / exam	2
Preparation for contact hours	5
Private reading and studying	12
Participation in tutorials	11
Preparation of project / essay / etc.	0
Preparation for test / exam	15
TOTAL workload	75
ECTS credits	3

Curriculum title:						
Course title: Genomics					Course code:	
Name of field of study: Genetics and experimental biology						
Mode and cycle of study:			Profile of study: general academic		Specialty:	
Course / module status				Language of instruction: English language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	laboratory	20	0	pg	3
		lecture	10	0	e	
Total			30			3
Course / module coordinator		dr Jakub Skorupski				
Course instructor		dr Jakub Skorupski				
Course / module objectives		familiarization with the tools and principles of contemporary genomics, including a working knowledge of current genomics technology and approaches as well as the types of databases and computational tools available				
Prerequisites		knowledge of biochemistry, genetics, and molecular and cellular biology				
LEARNING OUTCOMES						
Category	No.	Code	Description			Ref. to programme benchmarks
knowledge	1	EP1	The student explains core concepts and terminology in genomics, including genome organisation and variation, sequencing technologies (with an emphasis on high-throughput approaches), reference vs de novo genomics, and the main types of genomic data used in biological research (e.g. wholegenome, reduced-representation, transcriptomic).			K_W01 K_W04
	2	EP2	The student understands the major analytical principles behind genomic inference, including how genomic variation is generated and measured, and how genomics is applied to questions in evolution, ecology, biodiversity, and conservation (e.g. population structure, adaptation, demographic history, gene expression).			K_W01 K_W07
skills	1	EP3	The student performs basic genomic data workflows at an introductory level: handling common file formats, applying quality-control concepts, using reference-based approaches to obtain and filter variant data, and summarising genomic variation using standard descriptive outputs.			K_U01
	2	EP4	The student applies genomic evidence to biological questions by selecting appropriate methods and interpreting results from simplified analyses (e.g. population structure summaries, diversity estimates, differential expression overviews where applicable), and critically evaluates limitations, uncertainty and sources of bias (e.g. sampling design, coverage, batch			K_U01

social competences	1	EP5	The student is prepared to work responsibly in genomics, including collaboration in data-intensive projects, transparent documentation and reproducible practice, ethical handling and sharing of genomic data (including sensitive data where relevant), and clear communication of results and uncertainty to specialist and non-specialist audiences.	K_K04
CONTENT		Semester	No. of hours	
				including e-learning
Subject title: Genomics				
Format of instruction: lecture				
1. Course introduction, introduction to genomics		3	2	0
2. Contents, organization, and dynamics of genomes. The human genome		3	4	0
3. Functional genomics. Transcriptomics		3	4	0
Format of instruction: laboratory				
Genome sequencing. Genome assembly, mapping reads and pairwise alignment		3	4	0
Sequence modelling, prediction and genome annotation		3	4	0
Population genomics. Metagenomics		3	4	0
Phylogenomics. Evolutionary genomics. Paleogenomics		3	4	0
Genome-wide association studies. Conservation genomics		3	4	0
Modes of delivery	Lecture, multimedia presentation, in silico analyses/specialized software, work in groups, problem discussion, case study analysis			
	The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.			
Assessment methods			No. of learning outcome from the	
	Written exam		EP1, EP2, EP4	
	Verification by observation		EP3, EP4, EP5	
	Metody i formy weryfikacji efektów uczenia się mogą zostać zmienione dla studentów ze szczególnymi potrzebami na warunkach i zasadach określonych w			
Grading criteria	Course lecture completion with a grade is based on a positive result of a written exam covering the lecture content. Completion of laboratory classes based on activity and completion of tasks prepared by the instructor.			
Final grade calculation method	Arithmetic mean of grades from lectures and laboratory classes.			
Basic reading	Brown T.A. 2023. Genomes. CRC Press. Boca Raton Allendorf F.W. 2022 (or previous editions). Conservation and the Genomics of Populations. Oxford University Press. Oxford International Human Genome Sequencing Consortium. 2001. Initial sequencing and analysis of the human genome. Nature 409: 860			
Supplementary reading	Pevsner J. 2015. Bioinformatics and Functional Genomics. Wiley John&Sons Inc. Hoboken Lesk A. 2017. Introduction to Genomics. Oxford University Press. Oxford Boyle A. 2022. Essentials of Human Genomics. American Medical Publishers. New York			

STUDENT WORKLOAD

	No. of hours
Contact hours	30
Participation in test / exam	2
Preparation for contact hours	5
Private reading and studying	12
Participation in tutorials	11
Preparation of project / essay / etc.	0
Preparation for test / exam	15
TOTAL workload	75
ECTS credits	3

Curriculum title:						
Course title: Invasion Ecology				Course code:		
Name of field of study: Biology						
Mode and cycle of study:			Profile of study: general academic		Specialty:	
Course / module status			Language of instruction: English language			
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	laboratory	20	0	pg	3
		lecture	10	0	e	
Total			30			3
Course / module coordinator		dr Jakub Skorupski				
Course instructor		dr Jakub Skorupski				
Course / module objectives		Familiarisation with the theoretical and practical foundations of biological invasions, including the mechanisms and drivers of species introductions and spread, ecological and socioeconomic impacts of invasive non-indigenous species, and evidence-based approaches to prevention, early detection, monitoring, risk assessment and management to protect biodiversity and ecosystem functioning				
Prerequisites		General knowledge on ecology				
LEARNING OUTCOMES						
Category	No.	Code	Description	Ref. to programme benchmarks		
knowledge	1	EP1	The student defines and correctly uses key terminology of invasion ecology (e.g. alien, invasive, introduction pathways, propagule pressure, establishment, spread), and explains the main stages and mechanisms of biological invasions across ecosystem types.	K_W01 K_W04		
	2	EP2	The student explains ecological, environmental and human drivers of invasions (land-use change, disturbance, climate change, trade and transport), and recognises major ecological and socio-economic consequences of invasive species for biodiversity, ecosystem services and human well-being.	K_W01 K_W07		
skills	1	EP3	The student performs basic monitoring and assessment tasks relevant to invasions: recognising common invasive taxa (at least at a practical, field-identification level), documenting occurrences, using open biodiversity databases and simple GIS tools to map distributions and interpret spatial patterns.	K_U01		
	2	EP4	The student applies invasion ecology concepts to management practice by conducting a simplified risk assessment and proposing appropriate response options (prevention, early detection and rapid response, eradication, control/containment, mitigation and restoration), with justification based on evidence and feasibility.	K_U01		

social competences	1	EP5	The student is prepared to work collaboratively and responsibly in applied invasion-related tasks (fieldwork, data handling, stakeholder context), communicates findings clearly to non-specialists, and recognises ethical and practical constraints (including uncertainty and unintended consequences of interventions).	K_K04	
CONTENT			Semester	No. of hours	
					including e-learning
Subject title: Invasion Ecology					
Format of instruction: lecture					
1. Introduction to invasion ecology: definitions, terminology, invasion stages, invasion hypotheses	3	2	0		
2. Drivers and mechanisms: pathways of introduction, propagule pressure, disturbance, biotic interactions, invasion in terrestrial/freshwater/marine systems	3	3	0		
3. Impacts of invasive species on biodiversity, ecosystem functioning and services. Socio-economic and health impacts. "Invasional meltdown" and indirect effects	3	3	0		
4. Management and policy – prevention and biosecurity, EDRR, eradication/control, restoration. Legal frameworks and current challenges	3	2	0		
Format of instruction: laboratory					
1. Recognising invasive species in practice – diagnostic features, field guides, voucher documentation, citizen science records	3	4	0		
2. Mapping invasions: occurrence data (e.g. GBIF / national databases), data cleaning basics, simple GIS mapping and interpretation	3	4	0		
3. Pathways and risk – pathway analysis, introduction likelihood, basic risk-screening tools; uncertainty and bias	3	4	0		
4. Management planning workshop – selecting goals and indicators, prioritisation, rapid response vs long-term control. Evaluating costs and trade-offs	3	4	0		
5. Case study – local invasion problem diagnosis, monitoring protocol, and a short management brief (group work)	3	4	0		
Modes of delivery					
			Lecture, multimedia presentation, <i>in silico</i> analyses/specialized software, work in groups, problem discussion, case study analysis		
			The course teacher shall specify how artificial intelligence should be used as part of implementation of the course according to University of Szczecin best practices and standards. The course teacher shall inform students in their first class about the scope and possibilities of using AI and shall present a catalogue of tools and applications adjusted to relevant learning outcomes and teaching needs and possibilities within a given course.		
Assessment methods			No. of learning outcome from the		
			Written exam	EP1, EP2, EP4	
			Verification by observation	EP3, EP4, EP5	
Grading criteria			Course lecture completion with a grade is based on a positive result of a written exam covering the lecture content. Completion of laboratory classes based on activity and completion of tasks prepared by the instructor.		
			The final grade for the course is the arithmetic mean of the grades obtained in the exam and the laboratory.		
Final grade calculation method			Arithmetic mean of grades from lectures and laboratory classes.		
Basic reading			Lockwood, J. L., Hoopes, M. F., & Marchetti, M. P. (2013). <i>Invasion Ecology</i> (2nd ed.). Chichester, Wiley-Blackwell		
			Simberloff, D. (2013). <i>Invasive Species: What Everyone Needs to Know</i> ®. Oxford, Oxford University Press		
			Simberloff, Daniel & Ricciardi, Anthony (Eds.). (2020). <i>The Ecology of Invasions by Animals and Plants</i> (2nd edition). Cham, Springer		
Supplementary reading			Biological Invasions (Springer) journal		
			NeoBiota (Pensoft) journal		

STUDENT WORKLOAD

	No. of hours
Contact hours	30
Participation in test / exam	2
Preparation for contact hours	5
Private reading and studying	12
Participation in tutorials	11
Preparation of project / essay / etc.	0
Preparation for test / exam	15
TOTAL workload	75
ECTS credits	3

Curriculum title:						
Course title: Natural hazards					Course code:	
Name of field of study: Biotechnology						
Mode and cycle of study:			Profile of study: general academic		Specialty:	
Course / module status				Language of instruction: English language		
Year	Semester	Form of instruction	No. of hours		Type of credit	ECTS
				including e-learning		
2	3	laboratory	20	0	pg	3
		lecture	10	0	e	
Total			30			3
Course / module coordinator		dr Jakub Skorupski				
Course instructor		dr Jakub Skorupski				
Course / module objectives		The course aims to examine the disaster cycle – mitigation, preparation, response, and recovery – in the context of the interaction between natural hazards, such as floods, droughts, and earthquakes, and human society. It focuses on understanding the causes and impacts of natural disasters, with an emphasis on their ecological dimensions, including how ecosystems influence hazard dynamics and resilience. Students will explore the role of human activity in exacerbating or mitigating disaster risks and develop strategies for sustainable disaster management that balance societal needs with ecological conservation.				
Prerequisites		General knowledge on ecology				
LEARNING OUTCOMES						
Category	No.	Code	Description		Ref. to programme benchmarks	
knowledge	1	EP1	The student explains the classification, mechanisms and drivers of major natural hazards (e.g. geological, hydrometeorological, climatic and biological hazards), and understands their environmental		K_W01 K_W04	
	2	EP2	The student understands how natural hazards influence biological systems, including impacts on ecosystems, biodiversity, agriculture, public health and biotechnological infrastructure, and recognises the role of climate change in modifying hazard frequency and intensity		K_W01 K_W07	
skills	1	EP3	The student analyses selected natural hazard scenarios using environmental and biological data, identifies exposure and vulnerability factors, and interprets potential consequences for biological resources, food systems, and laboratory or industrial biotechnology facilities.		K_U01	
social competences	1	EP4	The student is prepared to act responsibly in situations involving environmental risk, recognizing ethical, safety and sustainability considerations, communicating risk clearly to diverse stakeholders, and understanding the societal importance of resilience and disaster risk reduction.		K_K04	

CONTENT	Semester	No. of hours	
			including e-learning
Subject title:			
Format of instruction: lecture			
1. Overview of natural hazards and disasters: definitions, classification, historical trends, and global impacts.	3	4	0
2. The disaster cycle: mitigation, preparation, response, and recovery. Geological hazards: earthquakes, tsunamis, volcanic eruptions, and landslides.	3	4	0
3. Hydrological and meteorological hazards: floods, droughts, storm surges, hurricanes, tornadoes, and extreme weather events	3	2	0
Format of instruction: laboratory			
1. Ecological hazards: wildfires, pest outbreaks, habitat degradation, and their links to natural disasters. Ecological dimensions of hazards: the role of ecosystems in hazard regulation, impacts on biodiversity, and ecosystem-based disaster risk reduction.	3	4	0
2. Human influence on hazards: urbanization, deforestation, climate change, and their role in increasing hazard risk	3	4	0
3. Methods for hazard mapping and vulnerability assessment. Risk management strategies: mitigation, response, cost-benefit analysis, and sustainable disaster planning	3	4	0
4. Advances in technology for hazard monitoring, forecasting, and early warning systems. Climate change and its implications for the frequency and intensity of future natural hazards.	3	4	0
5. Case studies of significant natural disasters: societal and ecological impacts, lessons learned, and best practices	3	4	0
Modes of delivery			
		Lecture, multimedia presentation, <i>in silico</i> analyses/specialized software, work in groups, problem discussion, case study analysis	
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Assessment methods			No. of learning outcome from the syllabus
		Written exam	EP1, EP2,
		Verification by observation	EP3, EP4,
Grading criteria		Course lecture completion with a grade is based on a positive result of a written exam covering the lecture content. Completion of laboratory classes based on activity and completion of tasks prepared by the instructor.	
		The final grade for the course is the arithmetic mean of the grades obtained in the exam and the laboratory.	
Final grade calculation method		Arithmetic mean of grades from lectures and laboratory classes.	
Basic reading		Abbott P.L. 2022. Natural Disasters. McGraw-Hill Education. New York	
		Hill L. 2022. Natural Hazards and Disaster Management. Callisto Reference. Forest Hills	
Supplementary reading		Hyndman D.W. 2016. Natural Hazards and Disasters. Cengage Learning Inc. Boston	

STUDENT WORKLOAD

	No. of hours
Contact hours	30
Participation in test / exam	2
Preparation for contact hours	5
Private reading and studying	12
Participation in tutorials	11
Preparation of project / essay / etc.	0
Preparation for test / exam	15
TOTAL workload	75
ECTS credits	3

