<table>
<tr><td colspan="4">*Subject*: Animal histology</td></tr>
<tr><td colspan="4">*Field of study*: Genetics and Experimental Biology</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>lecture</td><td>10</td><td rowspan="2">3</td><td rowspan="2">English</td></tr>
<tr><td>practical classes</td><td>20</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">dr hab. K. Dziewulska, prof. US</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">Provide students with knowledge of human tissues, organs and systems construction</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Knowledge of biology from secondary school</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">*Program content of lectures*
1. The structure, distribution and function of the epithelial, connective, blood, muscle, nerve tissues (8h).
2. Histology and function of the selected organs and systems (7h).
Program content of practical classes
1. Histological technique (2h)
2. Microscopic observation and structure analysis of epithelial, connective, blood, muscle, nerve tissues (6h)
3. Histology of selected organs – microscopic observation (7h)</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">- multimedia presentation
- individual observation under a microscope</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">- completion of lectures: final written test - knowledge from lectures and recommended literature
- completion of practical classes: passing of microscopic observation and drawing in notebook and written test
- Final evaluation: arithmetic mean of grades (test results for passing lectures and practical classes)</td></tr>
<tr><td>*Literature*</td><td colspan="3">Mescher A.L.- Junqueira's Basic Histology: text and atlas. McGraw Hill 16-th edition, 2021.
Gartner L. Textbook of histology. 5th edition, Elsevier 2020
Lowe J.S., Anderson P.G., Anderson S. (Stevens A., Lowe J.) – Stevens & Lowe's Human histology. Mosby Ltd, 2019
Mitchell B, Peel S. – Histology. Churchill Livingstone, Elsevier, Edinburgh 2009
Young B., O'Dowd G., Woodford P. - Wheater's functional histology. Churchill Livingstone, Elsevier 2013</td></tr>
</table>

C O U R S E S Y L L A B U S A N D S P E C I F I C A T I O N

Curriculum title: **USSPR-OilŚP-O-II-S-23/24Z**						
Course title: **Anthropogenic transformations of plant cover (antropogeniczne przekształcenia szaty roślinnej) (KIERUNKOWE)**					Course code: **US119AIIJ2456_15S**	
Name of field of study: **Environmental protection and engineering (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
				w tym e-learning		
1	2	discussion classes	15	0	pg	4
		lecture	15	0	pg	
Total			**30**			**4**

Course / module coordinator	**dr MONIKA MYŚLIWY**
Course instructor	**dr MONIKA MYŚLIWY**
Course / module objectives	**Acquainting students with the effects of anthropopressure at various levels of the biosphere organization. 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	
			w tym e-learning
Subject title: **antropogeniczne przekształcenia szaty roślinnej**			
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; synanthropodynamic classification of species, examples.**	2	2	0
2. **The impact of economic use of forests on vegetation, stages of neophytism, degeneration of phytocoenoses, autogenous and anthropogenic communities. Differentiators of pro-ecological forestry; anti-synanthropization decalogue.**	2	2	0
3. **Human impact on plant evolution, examples of taxa hybridization due to the abolition of geographic and ecological barriers, selection pressure, etc.**	2	2	0
4. **Methods of determining changes in plant cover; history of the vegetation of Western Pomerania against the background of climatic changes and anthropogenic influences. Characteristics of selected anthropogenic habitats; review of synanthropic plants in Poland.**	2	5	0
5. **Substitute communities of anthropogenic origin on the example of forest monocultures. Protection and management of wetlands.**	2	4	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 and identification of selected species using keys; 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	**Lecture with multimedia presentation, Group work, Individual work with plant material using microscopes, Project presentation.**	
Assessment methods		No. of learning outcome from the syllabus
	KOLOKWIUM	**EP1,EP2,EP4**
	PROJEKT	**EP5,EP6,EP7**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP3,EP4,EP6,EP7**
Grading criteria	**Credit for classes on the basis of active work in class, completion of worksheets and completion and presentation of the project. Credit for lectures on the basis of written test covering the content of lectures and recommended literature.**	
	Grade calculation principles	
	The final grade for the course is calculated on the basis of classes and lecture grades at a ratio of 1:1.	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	2	antropogeniczne przekształcenia szaty roślinnej		Arytmetyczna	
	2	antropogeniczne przekształcenia szaty roślinnej [ćwiczenia]	zaliczenie z oceną		
	2	antropogeniczne przekształcenia szaty roślinnej [wykład]	zaliczenie z oceną		

Basic reading	Adamowski W., Mędrzycki P., Łuczaj Ł. (1998): The penetration of alien woody species into the plant communities of the Białowieża Forest: the role of biological properties and human activities. In: Synanthropization of plant cover in new Polish research., Phytocoenosis 10 (N.S.), Suplementum Cartographiae Geobotanicae 9: 211-228.
	Barzdajn W., Ceitel J., Danielewicz W., Zientarski J. (1999): Leśnictwo proekologiczne. Zielona wstęga Odra-Nysa Projekt WWF., AR im. A. Cieszkowskiego, Poznań.
	Fudali E. (2009): Antropogeniczne zmiany w ekosystemach. Transformacje roślinności., Wyd. Uniw. Przyr. we Wrocławiu, Wrocław.
	Myśliwy M. (2008): Vascular plants of forest dividing-lines, analyzed in respect of forest complex synanthropisation., Biodiversity Research and Conservation 9-10: 63-72.
Supplementary reading	Faliński J.B. (1998): Invasive alien plants, vegetation dynamics and neopytism. In: Faliński J.B., Adamowski W., Jackowiak B (eds) Synantropization of plant cover in new Polish research., Phytocoenosis 10 (N.S.), Suplementum Cartographiae Geobotanicae 9: 163-187., Warszawa-Białowieża.
	Kornaś J., Medwecka-Kornaś A. (2002): Geografia roślin. Wydanie nowe., PWN, Warszawa.
	Myśliwy M. (2014): Habitat preferences of some neophytes, with a reference to habitat disturbances., Polish Journal of Ecology 63: 509-524.
	Sudnik-Wójcikowska B. (2011): Flora Polski. Rośliny synantropijne., Multico Oficyna Wydawnicza, Warszawa.

STUDENT WORKLOAD

	No. of hours	
		W tym 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	**18**	**0**
Preparation of project / essay / etc.	**15**	**0**
Preparation for test / exam	**20**	**0**
TOTAL workload	**100**	
ECTS credits	**4**	

<table>
<tr><td colspan="4">*Subject*: Basic histology for animal cell culture</td></tr>
<tr><td colspan="4">*Field of study*: Biotechnology</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>lecture</td><td>15</td><td rowspan="2">4</td><td rowspan="2">English</td></tr>
<tr><td>practical classes</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">dr hab. K. Dziewulska, prof. US</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">Provide students with knowledge of human tissues, organs, systems construction</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Knowledge of biology from secondary school</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">*Program content of lectures*
1. Histological technique (2h)
2. Introduction to cell culture. The structure, distribution and function of the epithelial, connective, blood, muscle, nerve tissues and susceptibility of cells to in vitro culture (10h).
3. Histology and function of the selected organs and systems (3h).
Program content of practical classes
1. Histological technique (2h)
2. Microscopic observation of epithelial, connective, blood, muscle, nerve tissues on histological slides (10h)
3. Histology of selected organs – microscopic observation (3h)</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">- multimedia presentation
- individual observation under a microscope</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">- completion of lectures: final written test - knowledge from lectures and recommended literature
- completion of practical classes: passing of microscopic observation and drawing in notebook and written test
- Final evaluation: arithmetic mean of grades (test results for passing lectures and practical classes)</td></tr>
<tr><td>*Literature*</td><td colspan="3">Mescher A.L.- Junqueira´s Basic Histology: text and atlas. McGraw Hill 16-th edition, 2021.
Gartner L. Textbook of histology. 5th edition, Elsevier 2020
Lowe J.S., Anderson P.G., Anderson S. (Stevens A., Lowe J.) – Stevens & Lowe’s Human histology. Mosby Ltd, 2019
Mitchell B, Peel S. – Histology. Churchill Livingstone, Elsevier, Edinburgh 2009
Young B., O'Dowd G., Woodford P. - Wheater's functional histology. Churchill Livingstone, Elsevier 2013</td></tr>
</table>

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-GiBE-O-I-S-24/25Z**	
Unit: **Przedmioty do wyboru I [moduł]**	
Course title: **Basics of plant taxonomy podstawy taksonomii roślin (KIERUNKOWE)**	Course code: **SPR85AIJ3446_31S**
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 - polish language**

Year	Semester	Form of instruction	No. of hours	including e-learning	Type of credit	ECTS
2	3	laboratory	20	0	pg	3
		lecture	10	0	pg	
Total			**30**			**3**

Course / module coordinator	**dr hab. HELENA WIĘCŁAW**
Course instructor	**dr hab. HELENA WIĘCŁAW , dr hab. BEATA BOSIACKA**
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_W02 K_W07
skills	1	EP3	The student is able to find in the literature and correctly apply information on plant taxonomy	K_U02 K_U07
	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 K_K03
	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: **podstawy 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. A modern, updated classification system for angiosperms - the APG system.**	3	4	0
3. **Phylogenetic taxonomy and methods used in phylogenetic analysis. Basic differences between Linean and phylogenetic taxonomy.**	3	4	0

Format of instruction: **laboratory**			
1. Taxonomic diversity and characteristics of bryophytes. Identification of plant materials based on micro- and macroscopic features.	3	2	0
2. Taxonomic review of clubmoss, horsetails and ferns. Identification of plant materials based on micro- and macroscopic features.	3	2	0
3. Classification, taxonomic diversity and characteristics of seed plants. Identification of plant materials based on micro- and macroscopic features.	3	16	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**
	SPRAWDZIAN	**EP1,EP2,EP3**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**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.** **Laboratoryclasses 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	podstawy taksonomii roślin		Arytmetyczna	
	3	podstawy taksonomii roślin [wykład]	zaliczenie z oceną		
	3	podstawy taksonomii roślin [laboratorium]	zaliczenie z oceną		

Basic reading	Rutkowski L. (2020): Klucz do oznaczania roślin naczyniowych Polski niżowej, Wydawnictwo Naukowe PWN, Warszawa
	Simpson M. G. (2010): Plant Systematics, Academic Press, Elsevier.
	Stace C. A. (1993): Taksonomia roślin i biosystematyka, PWN, Warszawa
	Szweykowska A., Szweykowski 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	**30**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**10**	**0**
Private reading and studying	**10**	**0**
Participation in tutorials	**8**	**0**
Preparation of project / essay / etc.	**0**	**0**

Preparation for test / exam	**15**	**0**
TOTAL workload	**75**	
ECTS credits	**3**	

<table>
<tr><td colspan="4">*Subject*: Behavioural ecology</td></tr>
<tr><td colspan="4">*Field of study*: biology</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>lectures</td><td>10</td><td rowspan="2">1</td><td rowspan="2">English</td></tr>
<tr><td></td><td></td></tr>
<tr><td>*Year/Semester*</td><td colspan="3">3/6</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">dr hab. Dariusz Wysocki, prof. US</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">Mastering the knowledge of the latest advances in behavioral ecology</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Basics of ecology and zoology</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Introduction to the biology of social vertebrates.
2. Biology of: *Aphelocoma californica, Turdoides squamiceps, Acrocephalus seschelensis, Melanerpes formicivorus, Parabuteo unicinctus, Aegithalos caudatus*
3. Biology of: meerkats, Primates, *Homo sapiens*</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">• Presentation
• Groupwork
• Practical classes</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Written exam</td></tr>
<tr><td>*Literature*</td><td colspan="3">• Krebs J.R., Davies N.B., West S.A. 2012. An Introduction to Behavioural Ecology. Wiley-Blackwell Chichester.
• F.B. Gill. 2007. Ornithology. Freeman</td></tr>
</table>

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Mik-O-II-S-24/25Z**		
Course title: **bioinformatyka mikrobiomów różnych środowisk (KIERUNKOWE)**		Course code: **SPR93AIIJ3450_57S**
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 - polish language**	

Year	Semester	Form of instruction	No. of hours	including e-learning	Type of credit	ECTS
1	2	laboratory	25	0	pg	2
Total			**25**			**2**

Course / module coordinator	**dr DANUTA CEMBROWSKA-LECH**
Course instructor	**dr DANUTA CEMBROWSKA-LECH**
Course / module objectives	**The aim of the course is for students to learn bioinformatics analysis of data from sequencing samples of various environments, as well as to learn the population composition and biological potential of organisms present in the tested material. Participants of the course have the opportunity to analyze data from 16S rRNA sequencing and metagenome sequencing using shotgun methods.**
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_W07
	2	EP2	the student knows the variety of types of biological data and the formats in which they are saved	K_W07
	3	EP3	the student knows selected issues of data analysis in metagenomics	K_W01 K_W05 K_W07
skills	1	EP4	the student is able to use regular expressions to edit and process text data	K_U05 K_U07
	2	EP5	the student is able to perform advanced numerical analysis of biological data and interpret the results	K_U03 K_U04 K_U05 K_U06
	3	EP6	the student is able to perform complex data analysis and skillfully select appropriate algorithms for this purpose	K_U03 K_U05 K_U07
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_K02 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 K_K03 K_K04

CONTENT	Semester	No. of hours	including e-learning
Subject title: **bioinformatyka mikrobiomów różnych środowisk**			
Format of instruction: **laboratory**			

1. **Introduction to bioinformatics in microbiology**	2	1	0
2. **DNA sequence assembly and annotation of genes**	2	4	0
3. **Introduction to phylogenetic analysis of molecular sequence data**	2	4	0
4. **Metagenomics data analysis: 16S rRNA amplicon sequencing**	2	8	0
5. **Data analysis in metagenomics: shotgun DNA sequencing (WGS)**	2	8	0

Modes of delivery	**Individual work, multimedia presentation, solving tasks, working on computers.**
	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
	PRACA PISEMNA/ ESEJ/ RECENZJA	**EP1,EP2,EP3,EP4,EP5,EP6,EP7,EP8**
	PROJEKT	**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	**Assessment criteria based on written project reports**
	Grade calculation principles
	The course grade is determined based on the final grade from laboratory classes

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	2	bioinformatyka mikrobiomów różnych środowisk		Ważona	
	2	bioinformatyka mikrobiomów różnych środowisk [laboratorium]	zaliczenie z oceną		1,00

Basic reading	Attwood Teresa K., Higgs Paul G. (2011): Bioinformatyka i ewolucja molekularna, PWN, Warszawa
	Błaszczak A., Frelik G. (2020): Wprowadzenie do bioinformatyki, PWN, Warszawa
Supplementary reading	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	**2**	**0**
Private reading and studying	**2**	**0**
Participation in tutorials	**13**	**0**
Preparation of project / essay / etc.	**3**	**0**
Preparation for test / exam	**3**	**0**
TOTAL workload	**50**	
ECTS credits	**2**	

	Subject: **Biological methods of water assessment**					Subject code: SPR208AIJ3450_31S	
	Nazwa jednostki prowadzącej przedmiot / moduł: **Institute of Biology**						
	Nazwa kierunku:						
	Forma studiów: **-**		Profil kształcenia: -			Specj-alność:	
	Year / semester: **2/3**		Status przedmiotu /modułu: **-**			Język przedmiotu / modułu: **English**	
	Forma zajęć	lecture	Practical classes	Laboratory	Discussion classes	seminar	Field classes
	Wymiar zajęć	**15**	**15**				

Koordynator przedmiotu / modułu	Prof. dr hab. inż. Robert Czerniawski
Prowadzący zajęcia	Prof. dr hab. inż. Robert Czerniawski, Dr Łukasz Sługocki, Dr Tomasz Krepski
Cel przedmiotu / modułu	The aim of the object is to provide for students an information about the freshwater biological and ecological assesment.
Wymagania wstępne	Basic knowledge of biology, ecology, physics, chemistry.

EFEKTY KSZTAŁCENIA		Odniesienie do efektów dla **programu**	Odniesienie do efektów dla **obszaru**
Wiedza	01 Student characterizes the methods of water basin assessment 02 Student knows the biological and ecological methods of freshwater assessment	K_W01 K_W07	P6S_WG P6S_WK
Umiejętności	03 Student choose the methods of water basin assessment 04 Student compares the characteristics of different water freshwater types	K_U02 K_U05	P6S_UW P6S_UK
Kompetencje społeczne	05 Student works independently 06 Student cares about water basins	K_K02 K_K04	P6S_KK P6S_KO P6S_KR

TREŚCI PROGRAMOWE		Liczba godzin
Forma zajęć – ćwiczenia		
	Bioindicators used in the freshwater assessment	7
	Ecological assessment of the river and lake	4
	Assessment of freshwaters in European Union	4

Metody kształcenia	• Multimedia presentation • Working in groups	
Metody weryfikacji efektów kształcenia		Nr efektu kształcenia z sylabusa
	• Grading • Test	01, 07 01, 02, 03, 05 04, 05 06, 07, 08
Forma i warunki zaliczenia	Class attendance, written tests	
Literatura podstawowa	Namienik J., Chrzanowski W., Szpinek P. 2003. Nowe horyzonty i wyzwania w analityce i monitoringu środowiska. CEEAM, Gdańsk. Kajak K. 2001. Hydrologia - Limnologia. Ekosystemy wód śródlądowych. PWN, Warszawa. Schiechtl B. 1999. Inżynieria ekologiczna w budownictwie wodnym i ziemnym. Wyd. Arkady. Bernatowicz S., Wolny P. 1974. Botanika dla limnologów i rybaków. PWRiL, Warszawa. Szlauer L., Szlauer B., Szlauer–Łukaszewska A., 2001. Niekonwencjonalne metody	

	oczyszczania wód, Nauka-Gospodarce, AR . Szczecin
Literatura uzupełniająca	Allan D. J. 1998. Ekologia wód płynących. Wyd. Nauk. PWN.

NAKŁAD PRACY STUDENTA:	
	Liczba godzin
Zajęcia dydaktyczne	30
Przygotowanie się do zajęć	-
Studiowanie literatury	6
Udział w konsultacjach	4
Przygotowanie projektu / eseju / itp.	-
Przygotowanie się do egzaminu / zaliczenia	10
Inne	30
ŁĄCZNY nakład pracy studenta w godz.	75
Liczba punktów ECTS	**3**

<table>
<tr><td colspan="4">*Subject*: Conservation ecology</td></tr>
<tr><td colspan="4">*Field of study*: biology</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>lectures</td><td>10</td><td rowspan="3">4</td><td rowspan="3">English</td></tr>
<tr><td>laboratory</td><td>20</td></tr>
<tr><td>field trip</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">dr inż. Jakub Skorupski</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">familiarization with theories and concepts of ecological foundations of preservation and management of biodiversity and natural resources</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Basics of general biology and ecology</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Introduction to conservation ecology. Conservation ecology as the branch of ecology and evolutionary biology
2. Preservation and management of biodiversity and natural resources. Restoration ecology – restoration, reintroduction, rewilding
3. Defining units of conservation
4. Ecological connectivity. Landscape genetics
5. Biological invasions
6. Ecosystem services
7. Sustainable development concept
8. Green and blue infrastructure
9. Inventory and valorisation of natural resources. Wildlife monitoring
10. Guided field trip – rewilding in action</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">• lecture
• multimedia presentation
• *in silico* analyses/specialized software
• work in groups
• problem discussion
• case study analysis</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Written exam</td></tr>
<tr><td>*Literature*</td><td colspan="3">1. Fryxell J.M., Sinclair A.R.E., Caughley G. 2014 (or previous editions). Wildlife Ecology, Conservation, and Management. Wiley-Blackwell. Hoboken
2. Lovejoy T.E., Hannah L., Wilson E.O. 2019. Biodiversity and Climate Change: Transforming the Biosphere. Yale University Press. London
3. Holl K. 2020. Primer of Ecological Restoration. Island Press. Washington</td></tr>
</table>

	4. Skorupski J. (ed.) et al. 2017. Invasive Alien Species – identification of threats to protect biodiversity. Polish Society for Conservation Genetics LUTREOLA. Szczecin 5. Global Ecology and Conservation (Elsevier)

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-BPK-O-II-S-23/24Z**	
Unit: **Blok wybieralny 1A**	
Course title: **Forensic aerobiology (aerobiologia sądowa) (KIERUNKOWE)**	Course code: **SPR92AIIJ3446_20S**
Name of field of study: **biologiczne podstawy kryminalistyki**	
Mode and cycle of study: **second degree, full - time**	Profile of study: **general academic** / Specialty:
Course / module status **elective**	Language of instruction: **semester: 2 - english language polish language**

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
1	2	laboratory	20	0	pg	2
		lecture	10	0	pg	
Total			**30**			**2**

Course / module coordinator	**dr hab. MAŁGORZATA PUC**
Course instructor	**dr hab. MAŁGORZATA PUC**
Course / module objectives	**Obtaining knowledge of bioaerosol composition, pollen morphology and phenomena influencing particle dispersion in the atmosphere. Acquainting with the practical significance of pollen and fungi spores in the judiciary (indication and differentiation of the nature of evidence in court proceedings). Acquisition: - the ability to recognize pollen grains and microscopic fungi spores, - the ability to make microscopic preparations,**
Prerequisites	**Basic program of biology for high school**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	1	EP1	Characterizes processes occurring in the air that influence pollen and spore dispersion in relation to pollination phenology and sporulation	K_W01
	2	EP2	Knows the structure of plant pollen and fungal disputes in the context of their use as evidence in court proceedings	K_W05
	3	EP3	Knows the sampling methodology for pollen and dispersal analyses in accordance with the procedures of microtrack analysis	K_W10
skills	1	EP4	Analyses correlations between phenological phenomenons, weather factors and pollen and spore occurence in the air over a given area	K_U04
	2	EP5	Microscopically recognizes selected pollen grains and fungal spores according to their morphological features	K_U05
	3	EP6	Applies methods of palynological analyses	K_U01
	4	EP7	Interprets literature data from a variety of sources (ex. in plant taxonomy)	K_U02
	5	EP8	Prepares conference reports for national and foreign conferences on the aerobiological issues	K_U13
	6	EP9	Presents the results of aeropalinological analyses in Polish or in a foreign language at scientific meetings	K_U15

social competences	1	EP10	**Demonstrates attention to the achievements and traditions of the profession**	**K_K05**

CONTENT	Semester	No. of hours	
			w tym e-learning
Subject title: **Forensic aerobiology (aerobiologia sądowa)**			
Format of instruction: **lecture**			
1. **History of forensic palynology and mycological analyzes in forensics. Morphology of pollen grains of taxa useful in forensics.**	2	2	0
2. **Pollen season and pollen calendar - determining the time and place of a crime based on presence of pollen grains on the surface of the tested objects. Meteorological, phenological and biogeographic factors, influencing the dispersion of pollen and spores in the atmosphere. Plant pollen as evidence material**	2	2	0
3. **Anamorphic fungal spores as evidence. Methodology of qualitative and quantitative assessment of pollen on the investigated objects**	2	2	0
4. **Morphological characteristics of selected spores, characteristics of fungal colonies**	2	2	0
5. **Use of aerobiological data in criminal and civil assault cases, burglary, forgery, homicide, rape, smuggling, drug trafficking and terrorism.**	2	2	0
Format of instruction: **laboratory**			
1. **Information on the rules of safe work at a laboratory stand. Microscopic preparation, permanent preparations with pollen and spores, staining, closing slides. Grain structure and recognition of plant pollen and fungal spores on microscopic slides.**	2	4	0
2. **Air sampling by volumetric and gravimetric method. Pollen and spores content analysis in the air. Seasonal dynamics. Structure and recognition of pollen grains and spores of fungi on microscopic slides**	2	4	0
3. **Analysis of exemplary cases (historical lawsuits, recreating conditions of crimes based on pollen material). Characteristics of the indoor environment. Analysis of the content of spores and pollen in the indoor environment. Construction and recognition of plant pollen grains and fungal spores on microscopic slides**	2	4	0
4. **Data analysis, descriptive statistics, correlation, multiple regression. Forecasting the beginning of pollen seasons. Development and analysis of pollen and spore calendars**	2	4	0
5. **Statistical prognostic models: artificial neural networks (ANN); multi-regressive neural tree (MRT).**	2	4	0

Modes of delivery	**- preparation of a project / essay, - microscopy and palynological preparation; - multimedia presentation**	
Assessment methods		No. of learning outcome from the syllabus
	PRACA PISEMNA/ ESEJ/ RECENZJA	**EP1,EP2,EP3,EP6**
	PREZENTACJA	**EP1,EP10,EP2,EP3, EP7,EP8,EP9**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP10,EP4,EP5,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	**ASSESSMENT for lectures - preparation of a project / essay based on the issues carried out during the lectures; ASSESSMENT FOR laboratories - partial written test, oral test - recognition of fungal spores and plant pollen under the microscope;**	
	Grade calculation principles	
	final grade from the exercises and grade from the written test / essay covering the content of the lecture in relation to practical exam in laboratories (sporomorph recognition) 1: 1	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	2	Forensic aerobiology (aerobiologia sądowa)		Arytmetyczna	
	2	Forensic aerobiology (aerobiologia sądowa) [wykład]	zaliczenie z oceną		
	2	Forensic aerobiology (aerobiologia sądowa) [laboratorium]	zaliczenie z oceną		

Basic reading	Burnett H., L. (1998): Illustrated Genera of Imperfecta Fungi, ISBN: 978-0-89054-192-0, USA
	Dybowa-Jachowicz S., Sadowska A. (red) (2003): Palinologia, PAN, Kraków
	George B. (2003): Illustrated Genera of Rust Fungi, Third Edition, ISBN: 978-0-89054-304-7, USA
	Weryszko-Chmielewska E. (red.) (2007): Aerobiologia, Wyd. Akademii Rolniczej, Lublin
Supplementary reading	autorzy artykułów (2019): International Journal of Criminal Investigation, AiT Labolatories, USA
	Mildenhall, D. C. Wiltshire, P. E. J. Bryant. V. M. (2006): Forensic palynology - Why do it and how it works, For Sci Int. 163, UK

STUDENT WORKLOAD

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

<table>
<tr><td colspan="4">*Subject*: Genomics</td></tr>
<tr><td colspan="4">*Field of study*: Genetics and experimental biology, 1st degree, winter semester</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>Lectures</td><td>10</td><td rowspan="3">3</td><td rowspan="3">English</td></tr>
<tr><td>Laboratory</td><td>20</td></tr>
<tr><td>field trip</td><td>0</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">dr inż. Jakub Skorupski</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">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</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">A familiarity with basic biochemistry, genetics, and molecular and cellular biology</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Course introduction, introduction to genomics
2. Contents, organization, and dynamics of genomes. The human genome
3. Genome sequencing
4. Genome assembly, mapping reads and pairwise alignment
5. Sequence modelling, prediction and genome annotation
6. Population genomics
7. Metagenomics
8. Phylogenomics. Evolutionary genomics. Paleogenomics
9. Conservation genomics
10. Functional genomics. Transcriptomics
11. Genome-wide association studies
12. Current status, future opportunities, and remaining challenges in genomics</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">• Lecture
• multimedia presentation
• *in silico* analyses/specialized software
• work in groups
• problem discussion
• case study analysis</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Written exam</td></tr>
<tr><td>*Literature*</td><td colspan="3">1. Brown T.A. 2023. Genomes. CRC Press. Boca Raton
2. Allendorf F.W. 2022 (or previous editions). Conservation and the Genomics of Populations. Oxford University Press. Oxford
3. International Human Genome Sequencing Consortium. 2001. Initial sequencing and analysis of the human genome. Nature 409: 860
4. Pevsner J. 2015. Bioinformatics and Functional Genomics. Wiley John&Sons Inc. Hoboken
5. Lesk A. 2017. Introduction to Genomics. Oxford University Press. Oxford
6. Boyle A. 2022. Essentials of Human Genomics. American Medical Publishers. New York</td></tr>
</table>

<table>
<tr><td colspan="4">*Subject*: hematological diagnostics</td></tr>
<tr><td colspan="4">*Field of study*: biology</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>Lectures</td><td>15</td><td rowspan="2">3</td><td rowspan="2">English</td></tr>
<tr><td>Laboratories</td><td>25</td></tr>
<tr><td>*Year/Semester*</td><td colspan="3">1/1</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Dr n. med. Katarzyna Sielatycka</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">The aim of teaching the subject is to familiarize students with the basic mechanisms of physiology and pathology of hematopoiesis in connection with diagnostic tests in the field of: hematology, cytomorphology and coagulology. In addition, mastering the ability to independently perform tests, interpret the results and assess their credibility.</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Basics knowledge of blood physiology.</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Peripheral blood morphology. Red blood cell system, white blood cell system and platelets
2. Diagnosis of hematological anemia.
3. Diagnostics of iron deficiency anemia.
4.Hemostasis. Basic research in the field of coagulation.
5. Methods of cytochemical and cytoenzymatic tests used in hematological diagnostics.</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">• Presentation
• Groupwork
• Practical classes</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Written exam</td></tr>
<tr><td>*Literature*</td><td colspan="3">1. Sophie Chargé, PhD, and Kendra Hodgkinson, PhD ; Blood: the basics; 2017
2. Mohamed Salama & Teruya-Feldstein Julie & Kremyanskaya Marina; Atlas of Diagnostic Hematology, 1st Edition; 2020</td></tr>
</table>

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Mik-O-II-S-22/23Z**		
Unit: **Blok przedmiotów do wyboru 3 [moduł]**		
Course title: **Immunological techniques based on molecular methods in microbial diagnostics (zastosowanie technik immunologicznych w diagnostyce mikrobiologicznej z wykorzystaniem metod molekularnych) (POZOSTAŁE PRZEDMIOTY / MODUŁY)**		Course code: **US93AIIJ119_18S**
Name of field of study: **microbiology** (**mikrobiologia)**		
Mode and cycle of study: **second 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	w tym e-learning	Type of credit	ECTS
2	3	laboratory	15	0	pg	3
		lecture	15	0	pg	
Total			**30**			**3**

Course / module coordinator	**dr hab. PAULINA NIEDŹWIEDZKA-RYSTWEJ**
Course instructor	**dr hab. PAULINA NIEDŹWIEDZKA-RYSTWEJ**
Course / module objectives	**Familiarization with immunological techniques that use the methods of molecular biology, used in microbiological diagnostics. Practicing the ability to apply selected methods of molecular biology for proper microbiological diagnostics. Working in a group, team, independent, building awareness of responsibility for the performed experiments.**
Prerequisites	**Basics of immunology**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	1	EP1	**Student characterizes and describes the role and importance of antibodies.**	K_W02
	2	EP2	**The student lists selected techniques of immunological methods based on biology molecular (e.g. ELISA, Blotting, flow cytometry).**	K_W06
skills	1	EP3	**The student selects the immunological method for the assumed research purpose and interprets the legitimacy of such selection.**	K_U01
	2	EP4	**The student interprets and is able to indicate the use of immunological techniques with the use of molecular biology.**	K_U02
social competences	1	EP5	**The student follows the safety rules.**	K_K09
	2	EP6	**The student perceives and is aware of the legitimacy of using molecular biology in immunology.**	K_K02
	3	EP7	**The student is aware of the imperfection of his knowledge and tries to verify and deepen it, using all methods of personal development.**	K_K01

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **zastosowanie technik immunologicznych w diagnostyce mikrobiologicznej z wykorzystaniem metod molekularnych**			
Format of instruction: **lecture**			
1. **Fundamentals of classical immunology - characteristics of antibodies, their application and production.**	3	4	0

2. **Selected tests used in diagnostics - ELISA, Blotting.**	3	3	0
3. **The use of antibodies labeled with fluorochromes: flow cytometry, fluorescence microscopy.**	3	4	0
4. **PCR and its variants in microbiological diagnostics.**	3	4	0
Format of instruction: **laboratory**			
1. **Detection of antigens using ELISA and Blotting technique.**	3	5	0
2. **Flow cytometry using labeled cells.**	3	5	0
3. **Practical application of selected techniques of molecular biology in microbiological diagnostics.**	3	5	0

Modes of delivery	**multimedia presentation; work in groups; practical classes**	
Assessment methods		No. of learning outcome from the syllabus
	KOLOKWIUM	**EP1,EP2,EP3,EP4**
	PRACTICAL CLASSES	**EP3,EP4,EP5,EP6,EP7**
Grading criteria	**Pass with a grade (a longer written statement based on the knowledge acquired during the lectures and contained in the basic literature). Passing the practical part on the basis of a written colloquium with questions mainly related to the practical performance of tasks.**	
	Grade calculation principles	
	The final grade is calculated on the basis of the grade for the exercises and the grade for passing the lecture content in a 1:1 ratio.	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	3	zastosowanie technik immunologicznych w diagnostyce mikrobiologicznej z wykorzystaniem metod molekularnych		Arytmetyczna	
	3	zastosowanie technik immunologicznych w diagnostyce mikrobiologicznej z wykorzystaniem metod molekularnych [laboratorium]	zaliczenie z oceną		
	3	zastosowanie technik immunologicznych w diagnostyce mikrobiologicznej z wykorzystaniem metod molekularnych [wykład]	zaliczenie z oceną		

Basic reading	Deptuła W., Tokarz-Deptuła B., Pisarski R. (2014): Immunologia - fakty znane i nieznane., Wyd. PWSZ, Legnica, Lenica
	Kątnik-Prastowska I. (2009): Immunochemia w biologii medycznej. Metody laboratoryjne., Wyd. Nauk. PWN, Warszawa
	Krawczyk B., Kur J. (2008): Diagnostyka molekularna w mikrobiologii., Wyd. Politechniki Gdańskiej., Gdańsk
	Ratledge C., Kristiansen B. (2011): Podstawy biotechnologii., Wyd. Nauk. PWN, Warszawa
	Słomski R. (2008): Analiza DNA - teoria i praktyka., Wyd. Uniw. Przyrodn. w Poznaniu, Poznań
	Szewczyk E. M. (2005): Diagnostyka bakteriologiczna., Wyd. Nauk. PWN, Warszawa
Supplementary reading	Czasopisma: Postępy Mikrobiologii; Przegląd Epidemiologiczny; Postępy Nauk Medycznych; Mikologia Lekarska, Diagnostyka Laboratoryjna, Postępy Biologii Komórki, Roczniki PZH, Journal of Immunological Methods :

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**30**	**0**
Participation in test / exam	**2**	**0**
Preparation for contact hours	**10**	**0**
Private reading and studying	**15**	**0**
Participation in tutorials	**6**	**0**

Preparation of project / essay / etc.	**0**	**0**
Preparation for test / exam	**12**	**0**

TOTAL workload	**75**
ECTS credits	**3**

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Mik-O-I-S-22/23Z**						
Course title: **Immunology (immunologia) (KIERUNKOWE)**					Course code: **US93AIJ2614_29S**	
Name of field of study: **microbiology** (**mikrobiologia)**						
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**
				w tym e-learning		
2	4	laboratory	30	0	pg	4
		lecture	30	0	e	
Total			**60**			**4**
Course / module coordinator	**dr hab. PAULINA NIEDŹWIEDZKA-RYSTWEJ**					
Course instructor	**dr hab. PAULINA NIEDŹWIEDZKA-RYSTWEJ**					
Course / module objectives	**Familiarization with the defense mechanisms of a macroorganism after contact with bacteria, viruses or fungi. Explanation of immunity reactions, including allergic reactions as well as those leading to immune diseases**					
Prerequisites	**Knowledge of the structure and pathogenic action of microorganisms (after a course in Bacteriology and in the subject Virology**					

LEARNING OUTCOMES

Category	**No.**	**Code**	**Description**	Ref. to programme benchmarks
knowledge	**1**	**EP1**	**The student characterizes the structure of the system immune system in mammals, including human**	**K_W01 K_W02 K_W05**
	2	**EP2**	**The student explains the mechanism of immune system cells.**	**K_W01 K_W05**
skills	**1**	**EP3**	**The student makes observations and characterizes the cells of the system immunity under the microscope**	**K_U02 K_U04**
	2	**EP4**	**The student analyzes the basics immune mechanisms and selects methods to detect the chosen immunity mechanism**	**K_U03 K_U04 K_U05**
	3	**EP5**	**The student interprets the results sample immunoassays**	**K_U04 K_U06 K_U07 K_U09**
	4	**EP6**	**The student analyzes the literature in the field issues discussed in the course**	**K_U06 K_U08 K_U11 K_U16**
	5	**EP11**	**The student is able to work independently and in the group**	**K_U17**
social competences	**1**	**EP8**	**The student is critical in assessing his own and others' work**	**K_K01 K_K07**
	2	**EP10**	**The student complies with the arrangements**	**K_K01 K_K05**
	3	**EP12**	**The student is ready to comply with the rules of professional ethics and to demand it from others**	**K_K08**

CONTENT	Semester	No. of hours	
			w tym e-learning
Subject title: **immunologia**			
Format of instruction: **lecture**			
1. Structure and function of organs and cells of the immune system (UO). The microbiome and the UO.	4	10	0
2. Mechanisms of specific and non-specific immunity (innate and acquired immunity)	4	14	0
3. Antigen pathway in UO and allergic reactions. Autoimmunity and immune diseases	4	6	0
Format of instruction: **laboratory**			
1. Blood cells as cells of the immune system in a microscopic image	4	6	0
2. Determination of specific and non-specific (innate and acquired) immunity by selected methods.	4	14	0
3. Serological reactions in immunological diagnosis. Monoclonal antibodies	4	6	0
4. Molecular biology tests in immunology	4	4	0

Modes of delivery	**Laboratories - practical classes, Lecture - multimedia presentation**	
Assessment methods		No. of learning outcome from the syllabus
	WRITTEN EXAM	**EP1,EP2**
	KOLOKWIUM	**EP1,EP2**
	TEST	**EP1,EP2,EP5,EP8**
	PRACTICAL CLASSES	**EP10,EP11,EP12,EP3,EP4,EP5,EP6,EP8**
Grading criteria	**Written exam (longer written statement) covering knowledge from lectures. Determining the final grade on the basis of partial grades received during the semester for specific activities and student work during classes**	
	Grade calculation principles	
	The final grade is calculated on the basis of the grade from the exam and the exercises in a ratio of 2:1.	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	4	immunologia		Ważona	
	4	immunologia [wykład]	egzamin		0,67
	4	immunologia [laboratorium]	zaliczenie z oceną		0,33

Basic 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 nieznane, , Wyd. PWSZ. , , D Legnica
	Deptuła W., Tokarz-Deptuła B., Stosik M., (2009): Immunologia dla biologów - wydanie nowe, Immunologia dla biologów - wydanie nowe., Wyd. US, Szczecin, Szczecin
	Gołab J., Jakóbisiak M., Lasek W., Stokłosa T. (2017): Immunologia., , Wydawnictwo naukowe PWN, , Warszawa
	Nicklin J., Graeme-Cook K., Paget T., Killington R. (2000): Krótkie wykłady -mikrobiologia., Wydawnictwo Naukowe PWN , Warszawa
	Płytycz B., Gliński Z., Jarosz J., Książkiewicz-Kapralska M., Markowska M., Skwarło-Sońta K. (1999): Immunologia porównawcza, , Wyd. UJ. , Kraków
Supplementary reading	Czasopisma: Alergia, Astma, Immunologia Kosmos Postępy Biochemii Postępy Biologii Komórki Postępy Higieny i Medycyny Doświadczalnej Postępy mikrobiologii Wszechświat

STUDENT WORKLOAD

	No. of hours	W tym e-learning
Contact hours	**60**	**0**
Participation in test / exam	**4**	**0**

Preparation for contact hours	**10**	**0**
Private reading and studying	**15**	**0**
Participation in tutorials	**4**	**0**
Preparation of project / essay / etc.	**0**	**0**
Preparation for test / exam	**7**	**0**
TOTAL workload	**100**	
ECTS credits	**4**	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Biotech-O-I-S-21/22Z**						
Course title: **In vitro culture of plant (roślinne kultury in vitro) (KIERUNKOWE)**					Course code: **US34AIJ2611_29S**	
Name of field of study: **biotechnology (biotechnologia)**						
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
				w tym e-learning		
3	5	laboratory	45	0	pg	4
		lecture	15	0	e	
Total			**60**			**4**

Course / module coordinator	**prof. dr hab. EWA KĘPCZYŃSKA**
Course instructor	**dr Anna Orłowska , prof. dr hab. EWA KĘPCZYŃSKA**
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: **roślinne kultury in vitro**			
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**
	EXAM	**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.** **During the period of hybrid teaching or only remote teaching, the conditions for passing the course will change to the following requirements:** **Passing through the MS Teams system.**
	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.

	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
Final grade calculation method	5	roślinne kultury in vitro		Ważona	
	5	roślinne kultury in vitro [wykład]	egzamin		0,33
	5	roślinne kultury in vitro [laboratorium]	zaliczenie z oceną		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)
	Kępczyńska E., Kępczyński J. (1998): Biotechnologia roślin - kultury in vitro, WNP US, Szczecin
	Malepszy S. (2009): Biotechnologia Roślin, Wydawnictwo Naukowe PWN, Warszawa
Supplementary reading	Biotechnologia - Computational Biology and Bionanotechnology, Kwartalnik (wybrane numery)
	Publikacje przeglądowe w biotechnologicznych czasopismach krajowych i zagranicznych

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**60**	**0**
Participation in test / exam	**4**	**0**
Preparation for contact hours	**10**	**0**
Private reading and studying	**5**	**0**
Participation in tutorials	**6**	**0**
Preparation of project / essay / etc.	**5**	**0**
Preparation for test / exam	**10**	**0**
TOTAL workload	**100**	
ECTS credits	**4**	

<table>
<tr><td colspan="4">*Subject*: Introduction to Conservation Biology</td></tr>
<tr><td colspan="4">*Field of study*: biology</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>lectures</td><td>10</td><td rowspan="3">4</td><td rowspan="3">English</td></tr>
<tr><td>laboratory</td><td>20</td></tr>
<tr><td>field trip</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">dr inż. Jakub Skorupski</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">familiarization with theories and concepts of importance for assessing the viability and status of plant and animal populations, in particular, the effects of population size on demographic and genetic processes that influence extinction risk</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Basics of general biology and ecology</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Defining conservation biology
2. Forms and patterns of biodiversity
3. Valuing biodiversity
4. Extinction – rates and patterns
5. Causes of population decline – habitat fragmentation, degradation and loss, pollution, overexploitation, invasive non-indigenous species, disease
6. Global change. Climate Change, , Invasive Species, Disease
7. Populations and habitats management. Species conservation. Protected areas. *Ex situ* and *in situ* conservation efforts. Restoration
8. Conservation categories. The IUCN Red List of Threatened Species
9. Conservation law
10. Guided field trip – valuing biodiversity in practice</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">• lecture
• multimedia presentation
• *in silico* analyses/specialized software
• work in groups
• problem discussion
• case study analysis</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Written exam</td></tr>
<tr><td>*Literature*</td><td colspan="3">1. Allendorf F.W. 2022 (or previous editions). Conservation and the Genomics of Populations. Oxford University Press. Oxford
2. Sodhi N.S. (ed.), Ehrlich P.R. (ed.). 2010. Conservation Biology for All. Oxford University Press. Oxford
3. Skorupski J. (ed.) et al. 2017. Invasive Alien Species – identification of threats to protect biodiversity. Polish Society for Conservation Genetics LUTREOLA. Szczecin</td></tr>
</table>

	4. Conservation Biology journal (The Society for Conservation Biology) 5. Conservation Letters journal (The Society for Conservation Biology)

<table>
<tr><td colspan="4">*Subject*: Introduction to conservation genetics</td></tr>
<tr><td colspan="4">*Field of study*: biology</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>lectures</td><td>10</td><td rowspan="3">4</td><td rowspan="3">English</td></tr>
<tr><td>laboratory</td><td>20</td></tr>
<tr><td>field trip</td><td>15</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">dr inż. Jakub Skorupski</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">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</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Basics of genetics and molecular biology</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Introduction to conservation genetics – terminology, methodology, position in the family of genetic sciences and among the branches of conservation biology
2. Analysis of genetic determinants of the most important threats to biodiversity
3. Application of genetics in the practice of nature conservation – application potential of conservation genetics
4. Protection of genetic resources of wild animals and plants
5. Legal and ethical aspects of conservation genetics
6. Application of molecular genetic methods in nature conservation
7. Application of *in silico* analyses in conservation genetics
8. Planning *ex situ* and *in situ* conservation activities based on conservation genetics
9. Controversial concepts within conservation genetics – de-extinction and conservation breeding improvement
10. Guided field trip to a conservation breeding centre for endangered species</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">• lecture
• multimedia presentation
• *in silico* analyses/specialized software
• work in groups
• problem discussion
• case study analysis</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Written exam</td></tr>
<tr><td>*Literature*</td><td colspan="3">1. Allendorf F.W. 2022 (or previous editions). Conservation and the Genomics of Populations. Oxford University Press. Oxford
2. Frankham R. 2010. Introduction to Conservation Genetics. Cambridge University Press. Cambridge
3. Ballou J.D., Briscoe D.A., Frankham R. 2009. A Primer of Conservation Genetics. Cambridge University Press. Cambridge</td></tr>
</table>

	4. Skorupski J. (ed.) et al. 2017. Conservation genetics in Poland – theory and practice. Polish Society for Conservation Genetics LUTREOLA. Szczecin 5. Conservation Genetics journal (Springer)

<table>
<tr><td colspan="4">*Subject*: Mitogenomics</td></tr>
<tr><td colspan="4">*Field of study*: Genetics and experimental biology, 1st degree, winter semester</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td>Lectures</td><td>10</td><td rowspan="3">3</td><td rowspan="3">English</td></tr>
<tr><td>Laboratory</td><td>20</td></tr>
<tr><td>field trip</td><td>0</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">dr inż. Jakub Skorupski</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">familiarization with the tools and principles of mitogenomics, including a working knowledge of current mitogenomics technology and approaches as well as the types of databases and computational tools available</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">A familiarity with basic biochemistry, genetics, and molecular and cellular biology</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">1. Course introduction, introduction to mitochondrial genomics
2. Contents, organization, and dynamics of mitogenomes
3. Mitochondrial genome sequencing and annotation
4. Online resources to explore mitochondrial genomics
5. Mitogenome evolution
6. Population mitogenomics
7. Phylomitogenomics
8. Clinical mitogenomics
9. Comparative mitogenomics
10. Mito-nuclear discordance and mtDNA in nuclear DNA
11. Use of mitochondrial genome in forensics
12. Current status, future opportunities, and remaining challenges in mitogenomics</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">• Lecture
• multimedia presentation
• in silico analyses/specialized software
• work in groups
• problem discussion
• case study analysis</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Written exam</td></tr>
<tr><td>*Literature*</td><td colspan="3">1. Gasparre G., Porcelli A.M. 2020. The Human Mitochondrial Genome. From Basic Biology to Disease. Elsevier Inc. Amsterdam
2. Nicholls T.J., Uhler J.P., Falkenberg M. 2023. Mitochondrial DNA. Methods and Protocols. Springer. Berlin
3. McCormick E.M., Muraresku C.C., Falk M.J. Mitochondrial Genomics: A complex field now coming of age. Curr. Genet. Med. Rep. 2018 6(2): 52-61
4. Silva-Pinheiro P., Minczuk M. 2022. The potential of mitochondrial genome engineering. Nat. Rev. Genet. 23: 199-214
5. Cappa R., de Campos C., Maxwell A.P., McKnight A.J. 2020. “Mitochondrial Toolbox” – A Review of Online Resources to Explore Mitochondrial Genomics. Front. Genet. 11: 439
6. Skorupski J. 2022. Characterisation of the Complete Mitochondrial Genome of Critically Endangered Mustela lutreola (Carnivora: Mustelidae) and Its Phylogenetic and Conservation Implications. Genes 13(1): 125</td></tr>
</table>

SYLLABUS

Subject: Molecular methods in taxonomic and population studies						
Field of study: biology						
Forma studiów: -		**Profil studiów:** -			**Specjalność: -**	
Status przedmiotu: -				**Język przedmiotu: English**		
Rok	**Semestr**	**Forma zajęć**	**Liczba godzin**		**Forma zaliczenia**	**ECTS**
				w tym e-learning		
3	5	lectures	15		exam	**4**
		laboratory	30			
Total			45	-		**4**

Koordynator przedmiotu:	Prof. dr hab. Andrzej Zawal
Prowadzący zajęcia:	Prof. dr hab. Andrzej Zawal, Prof. Dr hab. Agnieszka Szlauer-Łukaszewska, Dr Grzegorz Michoński, Mgr Aleksandra Bańkowska
Cele przedmiotu:	The aim of the course is to familiarize students with the methods of determining relationships between and within species and population characteristics based on molecular data.
Wymagania wstępne:	

EFEKTY UCZENIA SIĘ

Kategoria	**L.p.**	**Opis efektu**	**Odniesienie do efektów dla programu**
wiedza	1	The student defines the subject and scope of phylogenetic and population research	K_W01
	2	The student knows and understands at an advanced level the relationships of molecular research enabling understanding the principles of functioning of organisms at the species and population level. and interpreting and generalizing the possessed knowledge.	K_W03
umiejętności	1	The student is able to properly perform and interpret the analysis of relationship, critically analyzing and evaluating them, and to synthesize the data contained therein to formulate and solve problems	K_U02
	2	Can properly select and apply molecular data for intra-population and inter-species analyzes, and can 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
kompetencje społeczne	1	Student is willing to critically evaluate his knowledge and recognize the importance of general and specialist knowledge of molecular research in taxonomy and population studies in solving cognitive and practical problems, and to consult experts in the event of difficulties in solving problems on his own.	K_K02

TREŚCI PROGRAMOWE

L.p	Content of classes	semestr	liczba godzin
1	Various data used in phylogenetic and population analyzes.	II	
2	Taxonomic value of genetic traits at different levels of organisms classification.	II	

3	Philogeography, dispersion and specialization	II	
4	Population characteristics, demography, gene flow, population development	II	

Metody kształcenia:	multimedia presentation	
Metody weryfikacji efektów uczenia się		**Nr efektu uczenia się z sylabusa**
	Written exam	K_W01 K_W03 K_U02 K_U03 K_K02
Forma i warunki zaliczenia	The condition for obtaining estimation is participation in lectures and a passing the exam	

Metoda obliczania oceny końcowej	**Semestr**	**Przedmiot / forma**	**Rodzaj zaliczenia**	**Metoda obliczania oceny**	**Waga do średniej**

Literatura podstawowa	
	Joanna R. Freeland, Heather Kirk, Stephen Petersen 2011. Molecular Ecology, Second Edition. John Wiley & Sons, Ltd
	Avise, J. C. (1993); Molecular Markers, Natural History and Evolution. Chapman and Hall.
Literatura uzupełniająca	
	Barry G. Hall. 2008. Phylogenetic Trees Made Easy: A How-to Manual, third edition. Sinauer Associates, Sunderland, Massachusetts.

NAKŁAD PRACY STUDENTA

	Liczba godzin
Zajęcia dydaktyczne	45
Udział w egzaminie/zaliczeniu	2
Przygotowanie się do zajęć	15
Studiowanie literatury	10
Udział w konsultacjach	10
Przygotowanie projektu / eseju / itp.	0
Przygotowanie się do egzaminu / zaliczenia	18
Łączny nakład pracy studenta w godz.	100
Liczba punktów ECTS	**4**

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-B-O-II-S-23/24Z**	
Unit: **Blok wybieralny I [budowa, funkcja i rozwój organizmów] [moduł]**	
Course title: **Ornithology (ornitologia) (KIERUNKOWE)**	Course code: **SPR23AIIJ3446_2S**
Name of field of study: **biologia**	
Mode and cycle of study: **second degree, full - time**	Profile of study: **general academic** / Specialty:
Course / module status **elective**	Language of instruction: **semester: 1 - english language**

Year	Semester	Form of instruction	No. of hours	w tym e-learning	Type of credit	ECTS
1	1	laboratory	15	0	pg	2
		lecture	10	0	pg	
Total			**25**			**2**

Course / module coordinator	**dr hab. DARIUSZ WYSOCKI**
Course instructor	**dr hab. DARIUSZ WYSOCKI**
Course / module objectives	**Acquainting with selected issues concerning the biology of birds**
Prerequisites	**Knowledge of the systematics and anatomy of vertebrates**

LEARNING OUTCOMES

Category	No.	Code	Description	Ref. to programme benchmarks
knowledge	**1**	**EP1**	**explains complex phenomena and processes related to variability of birds**	**K_W01**
skills	**1**	**EP2**	**is able to integrate the obtained information and implement the latest achievements in the field of biological sciences**	**K_U02**
social competences	**1**	**EP3**	**critically evaluates the possessed knowledge and received content in the field of biological sciences**	**K_K01**

CONTENT	Semester	No. of hours	w tym e-learning
Subject title: **Ornithology (ornitologia)**			
Format of instruction: **lecture**			
1. **Overview of birds of different habitats**	1	10	0
Format of instruction: **laboratory**			
1. **Foraging optimization theory**	1	3	0
2. **Choice of environment and territory**	1	5	0
3. **Social behaviour**	1	3	0
4. **Population dynamics**	1	4	0

Modes of delivery	**lecture, project**

Assessment methods		No. of learning outcome from the syllabus
	KOLOKWIUM	**EP1,EP2,EP3**
	PREZENTACJA	**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	**Receiving a positive mark on the final test and a positive mark on the prepared presentation**	
	Grade calculation principles	
	Assessment of the presentation and final test 50:50	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	1	Ornithology (ornitologia)		Arytmetyczna	
	1	Ornithology (ornitologia) [laboratorium]	zaliczenie z oceną		
	1	Ornithology (ornitologia) [wykład]	zaliczenie z oceną		

Basic reading	Gill F. (2019): Ornitology, Freeman & Co
Supplementary reading	Jonsson L. (2003): Ptaki Europy i obszaru śródziemnomorskiego, Muza SA.
	J.R.Krebs, N.B.Davies (2021): Wprowadzenie do ekologii behawioralnej, PWN, Warszawa

STUDENT WORKLOAD

	No. of hours	
		W tym e-learning
Contact hours	**25**	**0**
Participation in test / exam	**1**	**0**
Preparation for contact hours	**5**	**0**
Private reading and studying	**2**	**0**
Participation in tutorials	**4**	**0**
Preparation of project / essay / etc.	**5**	**0**
Preparation for test / exam	**8**	**0**
TOTAL workload	**50**	
ECTS credits	**2**	

Subject: **Paleoecology**			
Field of study: biology			
Form of classes	*Class hours*	*ECTS*	*Language*
lecture	10	2	English
practical classes	15		
Coordinator:	dr hab. Małgorzata Puc, prof. US		
Objectives of the subject:	Familiarization with selected aspects of environmental paleoecology, with particular emphasis on paleopalynology and with the ecology of fossil plants. Providing knowledge about the relationship between the structure and functions of fossil organisms and their adaptations to the environment		
Requirement:	Knowledge of biology from secondary school		

Program content

Program content of lectures

1. Paleoecology as a field of paleontology (2h)
2. Reconstruction of the paleoenvironment and research into the mechanisms determining the changes in the natural environment on a global, regional and local scale (3h)
3. Ecology of fossil plant species. Relationships between the structure and functioning of fossil organisms and their adaptations to the environment (4h)
4. Outline of changes in the natural environment of Europe in the Quaternary against the background of the theory of climate and climate cycles
edaphic; changes in Poland's natural environment after the end of the last glaciation (3h)
5. Research methods in paleoecology: palaeobotanical lithology; absolute and relative dating (3h)

Program content of practical classes

1. Practical application of indoor air quality research methods (3h)
2. Preparation of microscopic slides (2h)
3. Pollen analysis. Structure and recognition of pollen grains of fossil species (4h)
4. Comparison of the structure of fossil pollen with modern pollen in analogous taxa (3h)
5. POLPAL pollen diagrams, isofield map analysis (3h)

Educational methods	- multimedia presentation - individual observation under a microscope
Form and conditions of passing the subject	- completion of lectures: final written test - knowledge from lectures and recommended literature - completion of practical classes: practical passing of microscopic observation (recognition of pollen and paleospores) as well as drawing in a notebook - final evaluation: arithmetic mean of grades (test results for passing lectures and practical classes)
Literature	-Darin A. Croft, Denise F. Su, Scott W. Simpson. (2018) Methods in Paleoecology. Springer. - David J. Bottjer. (2016) Paleoecology: Past, Present and Future. Wiley-Blackwell.

	- Warren D. Allmon and David J. Bottjer. (2001) Evolutionary Paleoecology. Columbia University Press. -Aerobiologia, Grana, Acta Agrobotanica, AAEM, Atmospheric Environment, Biogeociences, Int., J. Biometeorology

S Y L A B U S (KARTA PRZEDMIOTU)

Nazwa programu studiów: **USSPR-Mik-O-I-S-22/23Z**	
Moduł: **Blok przedmiotów do wyboru 1B**	
Nazwa przedmiotu: **plant disease and damage diagnostics (POZOSTAŁE PRZEDMIOTY / MODUŁY)**	Kod przedmiotu: **US93AIJ2611_21S**
Nazwa kierunku: **mikrobiologia**	
Forma studiów: **I stopnia lic., stacjonarne**	Profil studiów: **ogólnoakademicki** / Specjalność:
Status przedmiotu: **fakultatywny**	Język przedmiotu: **semestr: 3 - język angielski**

Rok	Semestr	Forma zajęć	Liczba godzin	w tym e-learning	Forma zaliczenia	ECTS
2	3	laboratorium	20	0	ZO	3
		wykład	15	0	ZO	
Razem			**35**			**3**

Koordynator przedmiotu:	**prof. dr hab. EWA KĘPCZYŃSKA**
Prowadzący zajęcia:	**dr Anna Orłowska , prof. dr hab. EWA KĘPCZYŃSKA**
Cele przedmiotu:	**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.**
Wymagania wstępne:	**Basic knowledge of the problems of Plant Physiology, Biochemistry, Microbiology, Molecular Biology**

EFEKTY UCZENIA SIĘ

Kategoria	Lp	KOD	Opis efektu	Odniesienie do efektów dla programu
wiedza	**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**

umiejętności	**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**
kompetencje społeczne	**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**

TREŚCI PROGRAMOWE ZAJĘĆ I KONSULTACJI	Semestr	Liczba godzin zajęć	
			w tym e-learning
Przedmiot: **plant disease and damage diagnostics**			
Forma zajęć: **wykład**			
1. **Plant diseases and methods of their identification (traditional and molecular)**	3	4	0
2. **Identification of infections plant diseases caused by microorganisms under natural conditions**	3	6	0
3. **Isolation of bacteria and fungi from diseased plants, their culture**	3	3	0
4. **Control methods of fungal, bacterial and viral diseases**	3	2	0
Forma zajęć: **laboratorium**			
1. **Methods of isolation of pathogenic organisms**	3	2	0
2. **Basic features of the structure of pathogenic organisms - identification**	3	3	0
3. **Assessment of the degree of infection by pathogenic fungi - isolation methodology**	3	3	0
4. **Assessment of the degree of infection by pathogenic fungi - identification**	3	3	0
5. **Isolation, culture and identification of fungal pathogens causing plant diseases in the form of spots and necrosis**	3	3	0
6. **Isolation, culture and identification of fungal pathogens causing plant diseases in the form of wilting**	3	3	0
7. **Macroscopic and microscopic identification of plant diseas symptoms**	3	3	0

Metody kształcenia	**carry out of experiments, work in groups, Multimedia presentation**	
Metody weryfikacji efektów uczenia się		Nr efektu uczenia się z sylabusa
	SPRAWDZIAN	**EP1,EP2,EP3,EP4**
	PRACA PISEMNA/ ESEJ/ RECENZJA	**EP5,EP6,EP7,EP8**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP10,EP11,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.	

Forma i warunki zaliczenia	**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**
	Zasady wyliczania oceny z przedmiotu
	Final grade is the arithemtic average of the evaluation of lectures and evaluation of classes calculated in the ratio of 1:1

Metoda obliczania oceny końcowej	Sem.	Przedmiot	Rodzaj zaliczenia	Metoda obl. oceny	Waga do średniej
	3	plant disease and damage diagnostics		Arytmetyczna	
	3	plant disease and damage diagnostics [laboratorium]	zaliczenie z oceną		
	3	plant disease and damage diagnostics [wykład]	zaliczenie z oceną		

Literatura podstawowa	Błaszkowski J., Tadych M., Madej T. (1999): Przewodnik do zajęć z fitopatologii, Akademia Rolnicza w Szczecinie, Szczecin
	Borecki Z. (2001): Nauka o chorobach roślin, PWRiL, Warszawa
	Kochman J. (1981): Zarys mikologii dla fitopatologów, Wyd. SGGW, Warszawa
	Mańka K. (1998): Fitopatologia leśna, PWRiL, Warszawa
	Müller, E., Loeffler, W. (1987): Zarys mikologii, PWRiL, Warszawa
	Szweykowscy A. i J. (2004): Botanika tom I i II, Wydawnictwo Naukowe PWN, Warszawa
Literatura uzupełniająca	Agrios G.N., (2005): Plant Pathology, Academic Press, San Diego California
	Nicklin J. i wsp. (2018): Mikrobiologia, Wydawnictwo Naukowe PWN, Warszawa
	Webster J., Weber R.W.S. (2007): Introduction to Fungi, Cambridge University Press, Cambridge

NAKŁAD PRACY STUDENTA

	Liczba godzin	
		W tym e-learning
Zajęcia dydaktyczne	**35**	**0**
Udział w egzaminie/zaliczeniu	**4**	**0**
Przygotowanie się do zajęć	**7**	**0**
Studiowanie literatury	**9**	**0**
Udział w konsultacjach	**10**	**0**
Przygotowanie projektu / eseju / itp.	**4**	**0**
Przygotowanie się do egzaminu/zaliczenia	**6**	**0**
ŁĄCZNY nakład pracy studenta w godz.	**75**	
Liczba punktów ECTS	**3**	

COURSE SYLLABUS AND SPECIFICATION

Curriculum title: **USSPR-Biotech-O-I-S-21/22Z**	
Unit: **Moduł V A [moduł]**	
Course title: **self-purification of water (KIERUNKOWE)**	Course code: **US34AIJ2457_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	w tym e-learning	Type of credit	ECTS
3	6	laboratory	15	0	pg	3
		lecture	15	0	pg	
Total			**30**			**3**

Course / module coordinator	**dr hab. inż. AGNIESZKA SZLAUER-ŁUKASZEWSKA**
Course instructor	**dr hab. inż. 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 aquatics 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	w tym e-learning
Subject title: **self-purification of water**			
Format of instruction: **lecture**			
1. **Mechanisms of self-purification**	6	2	0
2. **Water as a living environment**	6	1	0
3. **Surface water pollution**	6	4	0
4. **Saprobic zones**	6	2	0
5. **The importance of interactions between organisms in the self-purification process**	6	1	0
6. **Waterbodies susceptibility to degradation**	6	1	0
7. **Bioindication**	6	1	0
8. **Protection, monitoring, reservoir reclamation**	6	3	0
Format of instruction: **laboratory**			
1. **Characterization of surface water contamination and related groups of organisms.**	6	4	0
2. **Bioindication of the degree of pollution based on existing organisms**	6	2	0
3. **Laboratory experiments using various ecological formations for water treatment**	6	6	0
4. **Representatives of food guilds, their role in the processes of self-purification of water and the circulation of nutrients**	6	3	0

Modes of delivery	**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**	
Assessment methods		No. of learning outcome from the syllabus
	KOLOKWIUM	**EP1,EP2,EP3,EP4,EP5,EP6,EP9**
	ZAJĘCIA PRAKTYCZNE (WERYFIKACJA POPRZEZ OBSERWACJĘ)	**EP6,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	**Presence and activity on exercises.** **Performing practical tasks entrusted during the exercises** **Passing the colloquium with the content discussed during the lecture**	
	Grade calculation principles	
	Establishing a final grade based on partial marks received during the semester for specific student activities and work. **The grade is calculated on the basis of the final grade of the exercises and lectures in the ratio 1: 1**	

Final grade calculation method	Sem.	Course	Type of credit	Grade calc. method	Weight for the average
	6	self-purification of water		Arytmetyczna	
	6	self-purification of water [wykład]	zaliczenie z oceną		
	6	self-purification of water [laboratorium]	zaliczenie z oceną		

Basic reading	Chełmicki W. (2002): Woda. Zasoby, degradacja, ochrona, PWN, Warszawa
	Turoboyski L. (1979): Hydrobiologia techniczna, PWN, Warszawa
Supplementary reading	Allan J. D. (1998): Ekologia wód płynących, PWN, Warszawa
	Dojlido J. R. (1995): Chemia wód powierzchniowych, Wyd. Ekonomia i Środowisko, Białystok
	Kajak Z. (1998): Hydrobiologia i limnologia. Ekosystemy wód śródlądowych, PWN, Warszawa
	Lampert W. Sommer U. (1996): Ekologia wód śródlądowych, PWN, Warszawa

STUDENT WORKLOAD		
	No. of hours	
		W tym 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	**6**	**0**
Preparation of project / essay / etc.	**0**	**0**
Preparation for test / exam	**22**	**0**
TOTAL workload	**75**	
ECTS credits	**3**	

<table>
<tr><td colspan="4">*Subject*: Statistical methods in biology</td></tr>
<tr><td colspan="4">*Field of study*: biology</td></tr>
<tr><td>*Form of classes*</td><td>*Class hours*</td><td>*ECTS*</td><td>*Language*</td></tr>
<tr><td></td><td></td><td rowspan="2">2</td><td rowspan="2">English</td></tr>
<tr><td>laboratories</td><td>25</td></tr>
<tr><td>*Year/Semester*</td><td colspan="3">2/3</td></tr>
<tr><td>*Coordinator:*</td><td colspan="3">Dr hab. inż. Przemysław Śmietana, prof US</td></tr>
<tr><td>*Objectives of the subject:*</td><td colspan="3">In this introductory statistics course we will explore the use of statistical methodology in designing, analysing, interpreting, and presenting biological experiments and observations. We will cover descriptive statistics, elements of experimental design, probability, hypothesis testing and statistical inference, analysis of variance, correlation, regression techniques, and non-parametric statistical methods. Throughout the course the application of statistical techniques within a biological context will be emphasized, using data from laboratory and field studies.</td></tr>
<tr><td>*Requirement:*</td><td colspan="3">Basic knowledge of: ecology, the basics genetics, nature conservation.</td></tr>
<tr><td colspan="4">*Program content*</td></tr>
<tr><td colspan="4">students will emerge from the Biostatistics course with many new tools at their disposal, including being able to:
• construct and interpret graphical displays such as histograms, box plots, bar charts,
• calculate and interpret summary statistics for data sets,
• recognize basics of experimental design, including controls,
• appreciate the logic (convoluted) of statistical inference,
• construct and correctly interpret confidence intervals around point estimates,
• understand the proper use and interpretation of significance levels (p values),
• recognize and understand the relevance of probability distributions such as the normal & binomial,
• be able to formulate and test statistical hypotheses using 5 steps,
• recognize the situations when it is appropriate to use, and be able to perform: two-sample (independent or paired) t-tests, one factor analysis of variance, simple linear regression analysis, correlation, goodness of fit tests,
• know the conditions (assumptions) required for the validity of the above tests, and know which non-parametric alternatives can be used when such assumptions are not met
• know how to write a concise explanation of your statistical results,
• know how to use statistical software such as *Excel*, *Statistica* or *R* to describe biological data and to test specific biological hypotheses.</td></tr>
<tr><td>*Educational methods*</td><td colspan="3">• work in groups,
• individual work,
• multimedia presentation,
• work with computers</td></tr>
<tr><td>*Form and conditions of passing the subject*</td><td colspan="3">Written exam</td></tr>
<tr><td>*Literature*</td><td colspan="3">1. Moore, D. & McCabe G., Introduction to the Practice of Statistics, 9th Edition. Freeman, 2017.
2. Newbold, P., Statistics for Business and Econometrics. Prentice
3. Barbara Illowsky B., Dean S., Chiappetta L., Introductory Statistics. OpenStax. 2013</td></tr>
</table>

	4. Rosner B., Fundamentals of Biostatics) 7th Edition, 2015 5. Zar, J.,H., Biostatistical analysis. Fifth edition. Pretince-Hall, Inc. 2010

SYLLABUS

Subject code: SPR23AIJ3446_5S						
Subject name: Zoology of invertebrates						
Field of study: biology						
Forma studiów:-		**Profil studiów:** -			**Specjalność: -**	
Status przedmiotu: podstawowy				**Język przedmiotu: English**		
Rok	**Semestr**	**Forma zajęć**	**Liczba godzin**		**Forma zaliczenia**	**ECTS**
				w tym e-learning		
1	2	lecture	30		exam	**7**
		laboratory	45			
		Field classes	10			
RAZEM				-		**7**

Koordynator przedmiotu:	Prof. dr hab. Andrzej Zawal
Prowadzący zajęcia:	Prof. dr hab. Andrzej Zawal, Prof. Dr hab. Agnieszka Szlauer-Łukaszewska, Dr Grzegorz Michoński, Mgr Aleksandra Bańkowska
Cele przedmiotu:	The aim of the course is to familiarize students with the systematics, taxonomy and biology of invertebrates. After completing the course, the student knows the systematics, morphology and anatomy of basic groups of invertebrates and is able to recognize individual taxa of higher rank.
Wymagania wstępne:	

EFEKTY UCZENIA SIĘ

Kategoria	**L.p.**	**Opis efektu**	**Odniesienie do efektów dla programu**
wiedza	1	Student knows and understands at an advanced level selected facts, concepts and complex relationships between them and explaining theories, constituting the basic general knowledge in the field of natural sciences, forming the basis of zoology.	K_W01
	2	Student knows and understands at an advanced level the relationships of zoology and taxonomy of invertebrates with other natural disciplines, enabling the understanding of the principles of functioning of organisms as well as the interpretation and generalization of knowledge	K_W03
umiejętności	1	Student is able to properly select and use sources of scientific information, critically analyze and evaluate them, and synthesize the data contained therein to formulate and solve problems	K_U02
	2	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
kompetencje społeczne	1	Student is ready to critically evaluate his knowledge and perceived content, and to recognize the importance of general and specialist knowledge in invertebrate zoology in solving cognitive and practical problems, and to consult experts in the event of difficulties in solving problems on his own.	K_K02

CONTENT

Forma zajęć: lecture

L.p.	Treści	semestr	liczba godzin
1	Metazoa - taxonomy, theories of origin, animal archtecture.	II	
2	Parazoa, Cnidaria	II	
3	Parenchymata, Pseudocelomata, Annelida	II	
4	Crustacea, Chelicerata	II	
5	Insecta	II	
6	Mollusca	II	
7	Echinodermata	II	

Metody kształcenia:	multimedia presentation	
Metody weryfikacji efektów uczenia się		**Nr efektu uczenia się z sylabusa**
	Written exam	K_W01 K_W03 K_U02 K_U03 K_K02
Forma i warunki zaliczenia	The condition for obtaining estimation is participation in lectures and a passing the exam	

Metoda obliczania oceny końcowej		**Przedmiot / forma**	**Rodzaj zaliczenia**	**Metoda obliczania oceny**	**Waga do średniej**
		Lecture	exam		

Literatura podstawowa	
	Richard C. Brusca, Gary J. Brusca (2003) Invertebrates. 2nd Edition. Sinauer Associates, Inc., Publishers
Literatura uzupełniająca	

NAKŁAD PRACY STUDENTA

	Liczba godzin
Zajęcia dydaktyczne	85
Udział w egzaminie/zaliczeniu	5
Przygotowanie się do zajęć	15
Studiowanie literatury	20
Udział w konsultacjach	20
Przygotowanie projektu / eseju / itp.	10
Przygotowanie się do egzaminu / zaliczenia	20
Łączny nakład pracy studenta w godz.	175
Liczba punktów ECTS	**7**