SYLABUS (wersja pełna)

Nazwa programu studiów:						
Nazwa przedmiotu: Acarology						
Nazwa kierunku:						
Forma studiów: I stopnia, stacjonarne		**Profil studiów:** Ogólnoakademicki			**Specjalność: -**	
Status przedmiotu: podstawowy				**Język przedmiotu: angielski**		
Rok	**Semestr**	**Forma zajęć**	**Liczba godzin**		**Forma zaliczenia**	**ECTS**
				w tym e-learning		
I	II	wykład	15		egzamin	2
		ćwiczenia				
		zajęcia terenowe				
RAZEM			15	-		2
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 mites. After completing the course, the student knows the systematics, morphology and anatomy of the basic groups of mites and is able to recognize individual suborder and cohorts.				
Wymagania wstępne:		Zoology of invertebrates				

EFEKTY UCZENIA SIĘ

Kategoria	**L.p.**	**Opis efektu**	**Odniesienie do efektów dla programu**
wiedza	1	Student defines the subject and scope of knowledge about mites, in particular understands the need to know acarofauna in human life, in biological research and promoting science, also in relation to other arachnids.	K_W01
	2	Student knows and understands at an advanced level the relationships of acarology and other biological 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 acarology 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

Forma zajęć: wykład

L.p	Treści	semestr	liczba godzin
1	Introduction to acarology. Diagnosis of Acari order. Systematics of mites and their place among other Chelicerata. Characteristics of the orders within the Arachnida cluster	II	3
2	Classification of mites according to various authors. Main differentiating features of Anactiontrichida and Actinotrichida.	II	2
3	Morphologia of mites. Particular parts of body.	II	2
4	The integument and its products. Reproductive system. Reproductive biology.	II	2
5	Comparative morphology of mites. The most important distinguishing features of Notostigmata, Tetrastigmata, Mesostigmata, Metastigmata, Prostigmata, Astigmata and Cryptostigmata.	II	3
6	Systematic review of mites with a charakterization of selected families, genera and species, their importance for humans and nature.	II	3

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**
	II	Lecture	exam		
	II				
	II				

Literatura podstawowa	
	Gerald W. Krantz, D. E. Walter, 2009. A Manual of Acarology: Third Edition. Texas Tech University Press
Literatura uzupełniająca	
	David E. Walter, Heather C. Proctor 2013. Mites: Ecology, Evolution & Behaviour: Life at a Microscale 2nd Edition, Springer

NAKŁAD PRACY STUDENTA

	Liczba godzin
Zajęcia dydaktyczne	15
Udział w egzaminie/zaliczeniu	2
Przygotowanie się do zajęć	0
Studiowanie literatury	8
Udział w konsultacjach	15
Przygotowanie projektu / eseju / itp.	0
Przygotowanie się do egzaminu / zaliczenia	10
Łączny nakład pracy studenta w godz.	50
Liczba punktów ECTS	2

Subject: **Evolutionary ecology**			
Field of study: biology			
Form of classes	*Class hours*	*ECTS*	*Language*
lectures	15		English
Coordinator:	dr hab. Dariusz Wysocki, prof. US		
Objectives of the subject:	Mastering the knowledge of the latest advances in evolutionary ecology		
Requirement:	Basics of ecology and zoology		
Program content			
1. The influence of environmental conditions on the evolution of animals - mechanisms and examples . 2. Kin selection and inclusive fitness - insect socjety. 3. Evolution of sexuality and sexual selection			
Educational methods	• Presentation • Groupwork . • Practical classes		
Form and conditions of passing the subject	Written exam		
Literature	• Pianka, E.R. 2000. Evolutionary Ecology, 6th ed. Benjamin Cummings. • Fox, C.W., Roff, D.A. and Fairbairn, D.J. 2001. Evolutionary Ecology: Concepts and Case Studies. Oxford University Press • F.B. Gill. 2007. Ornithology. Freeman		

Wypełnia Zespół Kierunku							
	Nazwa przedmiotu: **Hydrobiology**					Kod przedmiotu:	
	Nazwa jednostki prowadzącej przedmiot / moduł: **Institute of Marine and Environmental Sciences**						
	Nazwa kierunku: Erazmus						
	Forma studiów: **-**		Profil kształcenia: **Academic (A)**			Specjalność	
	Rok / semestr: **-**		Status przedmiotu /modułu: **-**			Język przedmiotu / modułu: **English**	
	Forma zajęć	wykład	ćwiczenia	ćwiczenia laboratoryjne	konwersatorium	seminarium	inne (wpisać jakie)
	Wymiar zajęć	**15**					

Koordynator przedmiotu / modułu	Dr hab. Agnieszka Szlauer-Łukaszewska, prof. US
Prowadzący zajęcia	Prof. dr hab. Andrzej Zawal, dr hab. Agnieszka Szlauer-Łukaszewska prof. US, dr Grzegorz Michoński, mgr Aleksandra Bańkowska
Cel przedmiotu / modułu	Understanding the basics of hydrobiology, phenomena and processes occurring in biocenoses and aquatic ecosystems. Getting to know different types of reservoirs and their characteristics. Getting to know individual ecological formations and organisms typical for them and their adaptations to life in them. To get acquainted with examples of the practical use of hydrobiology in various aspects of water management and techniques for conducting hydrobiological research.
Wymagania wstępne	Systematics of animals, Systematics of plants, Environmental microbiology, General and analytical chemistry, Organic chemistry

EFEKTY KSZTAŁCENIA		Odniesienie do efektów dla **programu**	Odniesienie do efektów dla **obszaru**
Wiedza	The student understands and uses nomenclature and terminology in the field of hydrobiology. He knows the biology of organisms and the hydrobiological characteristics of various aquatic ecosystems.	K_W01	P1A_W01 R1A_W01 P1A_W01
Umiejętności	The student uses the tools for hydrobiological research and applies the techniques of hydrobiological research; The student classifies selected taxa to the appropriate type of habitats and ecological formation.	K_U01	P1A_U01 R1A_U05 X1A_U03 P1A_U01 P1A_U01
Kompetencje społeczne	Understands the necessity of ethical behavior in the use of aquatic ecosystems	K_K04	P1A_K04 X1A_K03

TREŚCI PROGRAMOWE	Liczba godzin

Forma zajęć – wykład	15
1 Physical and chemical properties of the aquatic environment	2
2 Types of aquatic ecosystems	2
3 Biocenoses of various types of water	2
4 Ecological formations and their functions in aquatic ecosystems.	2
5 Trophic typology of aquatic ecosystems.	3

Metody kształcenia	presentation based on the author's lecture scenario,	
Metody weryfikacji efektów kształcenia		Nr efektu kształcenia z sylabusa
	Written test	1,2,3, 4,5,6, 7,8,9
Forma i warunki zaliczenia	Test	
Literatura podstawowa	1. Stańczykowska, A. (1986). Zwierzęta bezkręgowe naszych wód. Wydawnictwa Szkolne i Pedagogiczne. 2. Kajak, Z. (1998) Hydrobiologia-Limnologia. Ekosystemy Wód Śródlądowych. PWN 3. Lampert, W., Sommer, W. 1996. Ekologia wód Śródlądowych. PWN	
Literatura uzupełniająca	1. Allan, J.D. (1998). Ekologia wód płynących. PWN. 2. Żmudziński L., Kornijów R., Bolałek J., Górniak A., Olańczuk-Meyman K., Pęczalska A., Korzeniewski K. (2002). Słownik hydrobiologiczny. PWN. 3. Mikulski J.S., 1982. Biologia wód śródlądowych . PWN 4. Starmach K., Wróbel S., Pasternak K. 1976. Hydrobiologia- Limnologia. PWN 5. Turoboyski L., 1979 Hydrobiologia techniczna. PWN 6. Kawecka B., Eloranta P. 1994. Zarys ekologii glonów wód słodkich i środowisk lądowych. PWN, Warszawa	

NAKŁAD PRACY STUDENTA:

	Liczba godzin
Zajęcia dydaktyczne	**15**
Przygotowanie się do zajęć	
Studiowanie literatury	
Udział w konsultacjach	
Przygotowanie projektu / eseju / itp.	
Przygotowanie się do egzaminu / zaliczenia	
Inne	
ŁĄCZNY nakład pracy studenta w godz.	
Liczba punktów ECTS	

Course name: **In vitro culture of plant**	Course code:

Name of the department carrying out the subject:
Faculty of Physical, Mathematical and Natural Science

Year/semester:	Course status:	Course language: English

Year	Semester	Form of class	Number of hours	Form of completion	ECTS
		Lecture	15		
		Exercice			
		Lab exercice	45		
		Discussion session			
		Seminar			
TOTAL			60		4

Teacher	Prof. dr hab Ewa Kępczyńska Dr Anna Orłowska
Course goal	To acquaint students with various types of cultures and in vitro techniques. The acquisition of practical skills in sterile work with plant material and plant reproduction in vitro.
Prerequisites	Basic knowledge of plant embryology, plant physiology, biochemistry and microbiology.

LEARNING EFFECTS

Category	Effect description	Reference to program effects
Knowledge	1. The student understands the basic phenomena and processes in the field of plant in vitro cultures.	
	2. The student has knowledge of the basic techniques used in plant in vitro cultures.	
	3. The student knows companies that produce plants in in vitro conditions.	
Skills	4. The student is able to perform calculations necessary for the preparation of culture media.	
	5. The student is able to draw conclusions based on the obtained experimental results.	
	6. The student is able to use the available laboratory equipment to prepare and conduct experiments.	
	7. The student is able to prepare a report on the conducted experiments.	
	8. The student is able to interact and work in a group.	
Social competences	9. The student acquires competence to comply with health and safety rules while working in the laboratory.	

PROGRAMME CONTENT

Form of class: Lectures

No.	Contents	Number of hours
1.	In vitro cultures in basic research and agriculture.	2
2.	Principles of using the techniques of in vitro culture.	2
3.	Types of cultures.	2
4.	Direct and indirect organogenesis.	2
5.	Somatic embryogenesis.	2
6.	Plant micropropagation.	2
7.	Release plants from viruses.	2
8.	Gynogenesis and androgenesis.	1

Form of class: Lab exercice		
1.	Mathematical calculations related to the preparation of the media.	5
2.	Preparation of culture media.	6
3.	Surface sterilization of plant material.	4
4.	Culture of isolated organs.	5
5.	Callus cultures of selected plant species.	6
6.	Induction of organogenesis on the example of selected plant species.	6
7.	Micropropagation of selected plant species.	9
8.	Acclimatization of selected plant species.	4

Educational methods	multimedia presentation work in groups performing experiments calculations
Verification methods of learning effects	**Number of effect from the syllbus**
	written exam (1;3) test (2;4;5) final report (5;7) observation of the student`s work (6;8;9)
Form and condition of completion	Lectures: Written exam checking the knowledge gained during the lectures (longer written notice). Lab exercice: Establishing a final grade on the basis of partial grades obtained during the semester for the test, report, and also on the basis of the student's activity during classes. The final grade of the course coordinator constitutes 33% of the grade for the laboratory exercises and 67% of the grade for the lectures
Basic literature	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 Kępczyńska E., Kępczyński J. (1998): Biotechnologia roślin - kultury in vitro, WNP US, Szczecin Malepszy S. (2009): Biotechnologia Roślin, Wydawnictwo Naukowe PWN, Warszawa
Supplementary literature	Biotechnologia - Computational Biology and Bionanotechnology, Quarterly (selected issues). Review publications in biotechnology journals

WORKLOAD OF A STUDENT

	Number of hours
Classes	**60**
Preparation to classes	**14**
Studying literature	**5**
Participation in consultations	**6**
Preparation of a project/essay/etc.	**5**
Preparation to exam/completion	**10**
Total workload of a student in hours	**100**
Number of ECTS	**4**

SYLABUS (wersja pełna)

Nazwa programu studiów:						
Nazwa przedmiotu: Molecular methods in taxonomic and population studies						
Nazwa kierunku: biologia						
Forma studiów: I stopnia, stacjonarne		**Profil studiów:** Ogólnoakademicki			**Specjalność: -**	
Status przedmiotu: podstawowy				**Język przedmiotu: angielski**		
Rok	**Semestr**	**Forma zajęć**	**Liczba godzin**		**Forma zaliczenia**	**ECTS**
				w tym e-learning		
I	II	wykład	15		egzam	2
		ćwiczenia				
		zajęcia terenowe				
RAZEM			15	-		2
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

Forma zajęć: wykład

L.p	Treści	semestr	liczba godzin

1	Various data used in phylogenetic and population analyzes.	II	2
2	Taxonomic value of genetic traits at different levels of organisms classification.	II	5
3	Philogeography, dispersion and specialization	II	3
4	Population characteristics, demography, gene flow, population development	II	5

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**
	II	Lecture	exam		
	II				
	II				

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	15
Udział w egzaminie/zaliczeniu	2
Przygotowanie się do zajęć	0
Studiowanie literatury	8
Udział w konsultacjach	15
Przygotowanie projektu / eseju / itp.	0
Przygotowanie się do egzaminu / zaliczenia	10
Łączny nakład pracy studenta w godz.	50
Liczba punktów ECTS	2

Wypełnia Zespół Kierunku							
	Nazwa przedmiotu: **Plant disease and damage diagnostics. Blok IB**					Kod przedmiotu: 13.4IV93.F…27	
	Nazwa jednostki prowadzącej przedmiot/moduł: **Wydział Biologii Katedra Biotechnologii Roślin**						
	Nazwa kierunku: **Mikrobiologia**						
	Forma studiów: **studia pierwszego stopnia studia stacjonarne**		Profil kształcenia: **ogólnoakademicki (A)**			Specjalność: -	
	Rok/semestr: **Rok II , semestr 3**		Status przedmiotu /modułu: **Fakultatywny – Moduł IB**			Język przedmiotu / modułu: **polski**	
	Forma zajęć	wykład	ćwiczenia	ćwiczenia laboratoryjne	konwersatorium	seminarium	inne (wpisać jakie)
	Wymiar zajęć	**15**	**15**				

Koordynator przedmiotu / modułu	Prof. dr hab. Ewa Kępczyńska
Prowadzący zajęcia	Prof. dr hab. Ewa Kępczyńska – lectures Dr Paulina Król - classes
Cel przedmiotu / modułu	The aim of the course is to introduce the student to the issues related to the etiology, symptomatology, epidemiology and pathogenesis of plant diseases caused by biotic factors and effects of influence of abiotic factors on plants.
Wymagania wstępne	Basic knowledge of Plant Physiology, Biochemistry, Microbiology and Molecular Biology

EFEKTY KSZTAŁCENIA			Odniesienie do efektów dla **programu**	Odniesienie do efektów dla **obszaru**
Wiedza	01	-The student knows the basic features of the representatives of the various plant pathogenic organisms, morphological and anatomical structures and methods of reproduction and distribution in the environment.	Wypełnia Zespół Kierunku ds. Jakości i Programów Kształcenia	P1A_W01 P1A_W04
	02	- The student is able to define and characterize the basic concept of phytopathology; has knowledge of the role and importance of abiotic factors and plant pathogens in the environment		P1A_W01 P1A_W05
	03	- The student knows and understands the issues of damages plants by various biotic and abiotic factors		P1A_W05
	04	- The student knows the most important concepts in the taxonomy and the rules of classification of the groups of phytopathogenic organisms; student is able to recognize the symptoms of disease in host plants		P1A_W04
Umiejętności	05	- The student has the ability to think logically, matching and comparison of the most important features of various plant pathogenic organism, has the ability to recognize the	Wypełnia Zespół Kierunku ds. Jakości i	P1A_U07

	06	symptoms of the plant diseases - The student is able to diagnose and identify the causes of plant diseases	Programów Kształcenia	P1A_U04
	07	- The student is able to perform tests to check the ability of plants to biotic and abiotic stress tolerance		P1A_U06
		- Basic statistical methods are used by student to describe the degree of plants damage		P1A_U01 P1A_U07
	08	- The student has the ability to self-learning, student completes literature as well updates and expands knowledge		P1A_U03 P1A_U11
Kompetencje społeczne	09	-The student actively participates in classes, is able to work in a team and has the ability to solve common problems, carefully perform assigned tasks	Wypełnia Zespół Kierunku ds. Jakości i Programów Kształcenia	P1A_K02 P1A_K03
	10	- The student is progressing in accordance with the principles of health and safety, cares about the workplace, equipment and material		P1A_K06
	11	- The student is open to a new knowledge and is aware of the possibility of its practical application		P1A_K01 P1A_K05

TREŚCI PROGRAMOWE	Liczba godzin
lectures	**15**
1. Plant diseases and methods of identifying them (conventional and molecular)	4
2. Identification of infectious plant diseases caused by microorganisms in the natural conditions	6
3. Isolation of bacteria and fungi from diseased plants. Culture and the importance of infectious agents	2,5
4. Methods of viral, bacterial and fungal plant diseases control	2,5
classes	**15**
1. Plant pathogenic organisms isolation methods.	2
2. Basic anatomy and morphology of plant pathogenic organisms - Identification	2
3. Assessment of plant infection by pathogenic fungi - method of isolation	2
4. Assessment of plant infection by pathogenic fungi - identification	2
5. Isolation, culture and identification of fungal pathogens that cause the pots and necrosis	2
6. Isolation, culture and identification of fungal pathogens that cause disease in the form of wilting	2,5
7. Macroscopic and microscopic diagnosis of plants with disease symptoms	2,5

Metody kształcenia	• multimedia presentation • work in groups • carry out the experiments	
Metody weryfikacji efektów kształcenia		Nr efektu kształcenia z sylabusa
	written exam, test, final report, observation of the student's work	01-04

		05-08 09-11
Forma i warunki zaliczenia	Grading Lectures: written exam to test knowledge gained during lectures (longer say writing) Classes: final evaluation based on the presence and partial grades received during the semester for, test, report and the student's activity in class	
Literatura podstawowa	Borecki Z. 2001. Nauka o chorobach roślin. PWRiL, Warszawa. Mańka K. 1998. Fitopatologia leśna. PWRiL, Warszawa. Kochman J. 1981. Zarys mikologii dla fitopatologów. Wyd. SGGW, Warszawa. Szweykowscy A. i J., 2004. Botanika. I Morfologia. II Systematyka. PWN, Warszawa. Müller, E., Loeffler, W., 1987. Zarys mikologii. PWRiL, Warszaw	
Literatura uzupełniająca	Agrios G.N., 2005, Plant Pathology. Academic Press. San Diego California. (dostępny w Katedrze)	

NAKŁAD PRACY STUDENTA:

	Liczba godzin
Zajęcia dydaktyczne	30
Przygotowanie się do zajęć	20
Studiowanie literatury	20
Udział w konsultacjach	10
Przygotowanie projektu / eseju / itp.	
Przygotowanie się do egzaminu / zaliczenia	10
Inne	
ŁĄCZNY nakład pracy studenta w godz.	90
Liczba punktów ECTS	3

Course name: **Regulation of plant development**				Course code:US85AIJ2612-25S	
Name of the department carrying out the subject: Faculty of Physical, Mathematical and natural Science					
Year/semester:2/3		Course status:		Course language: English	
Year	**Semester**	**Form of class**	**Number of hours**	**Form of completion**	**ECTS**
		Lecture	10	E	
		Exercice			
		Lab exercice	30		
		Discussion session			
		Seminar			
TOTAL			40		
Teacher			Prof. dr hab. Jan Kępczyński		
Course goal			Aim of the course is to provide students with the overview of significant environmental factors and plant growth regulators which influence plant development.		
Prerequisites			Basic knowledge of plant physiology and cell biology		

LEARNING EFFECTS

Category	Effect description	Reference to program effects
Knowledge	Student will acquire basic knowledge of degradations, biosynthesis and action mechanisms of phytohormones.	
	The student knows the stages of the life cycle of plants.	
	Student classifies plant movements.	
Skills	They will analyze chosen parameters of plant development using different laboratory techniques.	
	Students are expected to gain practical skills in manipulation of growth and development of plants at different stages of life cycles.	
Social competences	The student is aware of the level of his knowledge and skills, understands the need for continuous training.	
	The student takes care to keep order in the classroom and to carefully perform the planned tasks.	

PROGRAMME CONTENT

Form of class: Lectures

No.	Contents	Number of hours
1.	Characteristics of plant growth and development.	2
2.	The participation of light and other environmental factors in the regulation of physiological processes in plants. Dormancy. Germination. Phytochrome. Flowering.	2
3.	Characteristics of phytohormones. Phytohormone metabolism. Transport of phytohormones.	2
4.	Regulation of physiological processes by phytohormones. Mechanism of action.	4

Form of class: Laboratory.		
1.	Analysis of selected plant development parameters	5
2.	The influence of environmental factors on the growth and development of plants.	10
3.	Influence of phytohormones on plant growth and development.	5
4.	Determination of ethylene production	5
5.	Observation of plant movements	5

Educational methods	Lectures - multimedia presentation Laboratories - group work and independent work, discussion
Verification methods of learning effects	**Number of effect from the syllabus**
	written exam (1,2,3,4,5) test (1,2,3,4,5) written work (4,6,7) observation of the student work (5,6,7,8)
Form and condition of completion	Lectures-written exam checking the knowledge gained during the lectures Laboratory- establishing a final grade on the basis of partial grades obtained from tests and activity in the classroom. The final grade is calculated by the course coordinator as the arithmetic mean of grades from lectures and laboratories.
Basic literature	Taiz L., Zeiger E.(red.) Plant Physiology.4th edition, Sinauer Associates, Inc.
Supplementary literature	Review publications in plant physiology journals

WORKLOAD OF A STUDENT

	Number of hours
Classes	**40**
Preparation to classes	**10**
Studying literature	**15**
Participation in consultations	**11**
Preparation of a project/essay/etc.	**12**
Preparation to exam/completion	**12**
Total workload of a student in hours	**100**
Number of ECTS	**4**

<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>lectures</td><td></td><td rowspan="2"></td><td rowspan="2">English</td></tr>
<tr><td>discussion session</td><td></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
4. Rosner B., Fundamentals of Biostatics) 7th Edition, 2015
5. Zar, J.,H., Biostatistical analysis. Fifth edition. Pretince-Hall, Inc. 2010</td></tr>
</table>

Course name: **Viral, microbial and fungal plants diseases**	Course code:

Name of the department carrying out the subject:
Faculty of Physical, Mathematical and Natural Science

Year/semester:	Course status:	Course language: English

Year	Semester	Form of class	Number of hours	Form of completion	ECTS
		Lecture	15		
		Exercice			
		Lab exercice	30		
		Discussion session			
		Seminar			
TOTAL			45		3

Teacher	Prof. dr hab Ewa Kępczyńska Mgr Piotr Karczyński
Course goal	The aim of the course is to introduce students to the issues related to the etiology, epidemiology, pathogenesis of plant diseases caused by viruses, bacteria and pathogenic fungi, and the methods of plant protection.
Prerequisites	Basic knowledge of plant physiology, biochemistry, microbiology and molecular biology.

LEARNING EFFECTS

Category	Effect description	Reference to program effects
Knowledge	1. The student knows the basic features of the representatives of the various plant pathogenic organisms, morphological and anatomical structures and methods of reproduction and distribution in the environment.	
	2. The student is able to define and characterize the basic concept of phytopathology; has knowledge of the role and importance of abiotic factors and plant pathogens in the environment.	
	3. The student knows the most important concepts in the taxonomy and the rules of classification of the groups of phytopathogenic organisms; student is able to recognize the symptoms of disease in host plants.	
	4. The student knows and understands the interactions between fungi and other organisms and knows the basic methods of combating and limiting the development and spread of plant diseases	
Skills	5. The student has the ability to think logically, matching and comparison of the most important features of various plant pathogenic organism, has the ability to recognize the symptoms of the plant diseases.	
	6. The student is able to analyze the influence of biotic and abiotic factors	

	shaping the development and spread of pathogens.	
	7. The student has the ability to self-learning, student completes literature as well updates and expands knowledge.	
	8. The student independently describes the relationship between plants, their pathogens and the environment.	
	9. The student is able to work in a team, has the ability to solve common problems, carefully carefully perform assigned tasks.	
Social competences	10. The student is progressing in accordance with the principles of health and safety, cares about the workplace, equipment and material.	
	11. The student is open to a new knowledge and is aware of the possibility of its practical application.	

PROGRAMME CONTENT

Form of class: Lectures

No.	Contents	Number of hours
1.	Plant diseases and their symptoms.	2
2.	The most important biotic pathogens: viruses, bacteria and fungi. Prevention and combating diseases.	4
3.	Review of plant diseases caused by viruses, bacteria and fungi.	2
4.	Isolation of viruses, bacteria and fungi from diseased plants and their culture and importance.	2
5.	Methods of identifying infectious agents - traditional and molecular.	2
6.	Molecular basis of plant disease resistance.	2
7.	The importance of plant diseases in human life and economy.	1
Form of class: Lab exercice		
1.	Plant pathogenic organisms isolation methods.	5
2.	Basic features of the structure of plant pathogenic organisms - identification.	4
3.	Structure of the thallus and vegetative and generative structures produced by phytopathogenic fungi.	4
4.	Fungi causing disease symptoms in the form of spots, necrosis.	4
5.	Fungi causing symptoms in the form of wilt.	4
6.	Artificial inoculation of plants.	4
7.	Macroscopic and microscopic diagnostics of plants with symptoms of diseases.	5

Educational methods	Information and conversation lecture conducted with the use of multimedia presentations combined with a discussion of selected problems. Laboratories conducted using the method of working in groups and performing experiments independently.
Verification methods of learning effects	**Number of effect from the syllbus**
	written exam (10;11) test (1;2;3;4;5;6;7;8) practical classes (observation of the student's work) (10;11;5;6;7;8;9)
Form and condition of completion	Lectures: Written exam checking the knowledge gained during the lectures (longer written notice). Lab exercice:

	Establishing a final grade on the basis of partial grades obtained during the semester for the test, report, and also on the basis of the student's activity during classes. The final grade for the course coordinator is calculated as the arithmetic mean of the grades from laboratories and lectures.
Basic literature	Agrios G.N. (2005): Plant Pathology, Academic Press, San Diego California Webster J., Weber R.W.S. (2007): Introduction to Fungi, Cambridge University Press, Cambridge
Supplementary literature	Review publications in phytopathology journals

WORKLOAD OF A STUDENT

	Number of hours
Classes	**45**
Preparation to classes	**9**
Studying literature	**7**
Participation in consultations	**8**
Preparation of a project/essay/etc.	**0**
Preparation to exam/completion	**6**
Total workload of a student in hours	**75**
Number of ECTS	**3**