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COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ EFZ1/03	**Course name:** Animal and Human Ecophysiology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 6

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
Elaboration of semestral thesis.

Learning outcomes:
To understand the basic mechanisms of adaptations to environmental factors in animals and humans.

Brief outline of the course:
1. Definition of the subject. External environment characteristics. Environmental factors, classification, time factor. Reaction, adaptation, deformation. Classification of adaptations. Stress reaction, general adaptation syndrome.
2. Pathological reaction, pathological state, disease. General characteristics of disease – pain, fever, inflammation.
3. Ageing, theories, physiological changes in ageing. Death of organism. Adaptations to food intake changes and food composition. Food intake regulation.
4. Caloric restriction, starving, increased caloric intake, obesity. Time factor in food intake.
5. Thermoregulation, heat and cold adaptations. Hibernation, diapause.
6. Altitude and hyperbaric adaptations. Osmoregulation.
7. The effects of hypergravity and microgravity, physiological changes during space flight. Sound, ultrasound, infrasound effects.
8. Electromagnetic fields. Effects of electric current. Infrared, visible, ultraviolet radiation and their significance for organisms. Microwaves. Laser.
9. Ionising radiation, classification, sources. The effects of ionising radiation.
10. Xenobiotics, biotransformation. Air, water, and soil pollutants.
11. Drug abuse, mechanism of drug action. The effects of opioids and CNS depressants – sedatives, hypnotics, and alcohol.
12. The effects of CNS stimulants – amphetamines, cocaine, methylxanthines, nicotin. The effects of hallucinogens and solvents.
13. Carcinogenesis, chemical, physical, and biological carcinogens. Oncogenes, tumour suppressor genes. Prevention of carcinogenesis. Prions.

Recommended literature:
1. Piantadosi C.A. Biology of Human Survival: Life and Death in Extreme Environments. Oxford Press 2003.

2. Wilmer P and co.: Environmental Physiology of Animals. Blackwell Publishing Inc., 2004
3. Chown SL, Nicolson SW: Insect Physiological Ecology. Oxford University Press 2004

Course language:

Notes:

Course assessment
Total number of assessed students: 451

A	B	C	D	E	FX
14.19	22.62	22.62	23.06	16.41	1.11

Provides: doc. RNDr. Bianka Bojková, PhD.

Date of last modification: 14.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ AMK/15	**Course name:** Applied Microbiology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

Conditions for course completion:
Attendance of practicals (at least 90%), final examination

Learning outcomes:
The students will acquire in-depth knowledge on the important role of microoganisms in different fields like food (production of beer, wine, milk products, probiotics), chemical and pharmaceutical industry (production of vitamins, hormones, amino acids, enzymes, comodity chemicals), vaccines and their production, wastewater treatment, as well as microbial bioremediation, biofuels and biomining.

Brief outline of the course:
Application of bacteria in industrial processes, biochemicals production. Application of recombinant DNA techniques in industry. Lactic acid bacteria and its application in food industry. Microbiology in food quality control. Application of microorganisms in environment protection – wastewater treatment, bioremediation, biofuels, microbiology of biogas plants.

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 55

A	B	C	D	E	FX	N	P
52.73	18.18	14.55	3.64	0.0	0.0	0.0	10.91

Provides: doc. RNDr. Peter Pristaš, CSc., univerzitný profesor, RNDr. Lenka Maliničová, PhD., RNDr. Jana Kisková, PhD., RNDr. Mariana Kolesárová, PhD., RNDr. Ivana Slepáková, PhD.

Date of last modification: 23.06.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ MMZ/20	**Course name:** Basic molecular methods in Zoology and Animal Physiology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 1 / 2 **Per study period:** 14 / 28
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
Ongoing evaluation: active participation on practical exercises
Final evaluation: fulfilling the practical task

Learning outcomes:
Practical skills in the following techniques:
- Pipetting methods,
- DNA/RNA extraction,
- PCR methods (PCR, RT-PCR, qRT-PCR) + electrophoretic visualization
- database NCBI (GenBank, BOLD)
- basic instructions in using of phylogenetic program Mega: sequences trimming, construction of phylogenetic trees

Brief outline of the course:
The aim of the subject is to introduce the methods of molecular biology as the tools used to solve problems of zoological, ecological and physiological studies, in both theoretical but first of all in practical form.
The course focuses on basic molecular methods used in studies of taxonomy, ecology and physiology of animals (invertebrates and vertebrates). The main task is to provide not only theoretical knowledge, but in the form of practical exercises, mainly skills usable in practice (especially in the solution of future bachelor and master theses).

Recommended literature:
Šmarda a kol. 2005. Metody molekulární biologie. Masarykova univerzita, Brno.
Weaver, R.F. 2002. Molecular biology. University of Kansas
Pastoráková A. & Petrovič, R. 2016. Molekulárne metódy aktuálne používané v klinickej genetike. Univerzita Komenského v Bratislave, Lekárska fakulta

Course language:
Slovak or English language

Notes:

Course assessment
Total number of assessed students: 25

A	B	C	D	E	FX
28.0	44.0	12.0	16.0	0.0	0.0

Provides: RNDr. Andrea Rendošová, PhD.

Date of last modification: 26.02.2025

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ BIONF/16	**Course name:** Bioinformatics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
attendance at lectures and practicals (at least 80%), continuous evaluation of the performance of tasks, final examination

Learning outcomes:
The students will acquire basic knowledge of biological databases, acquisition and analysis of sequencing data, biological approaches in phylogenetic analysis, construction and interpretation of phylogenetic trees and methods for molecular identification of organisms

Brief outline of the course:
Introduction to Bionformatics, free accessible biological and biomedical databases, free available bioinformatics tools. Analysis of biopolymers - nucleic acids and proteins. Pairwise sequence comparisons, multiple sequence comparisons, analysis of evolutionary and phylogenetic relatedness of biopolymers, creation and analysis of phylogenetic trees, molecular identification of organisms.

Recommended literature:
Cvrčková F. Úvod do praktické bioinformatiky. Česko: Academia, 2006. 148 s. ISBN 80-200-1360-1.
Brown, T. A. Genomes 3. 3rd ed. New York : Garland Science Publishing. 2007. 713 p. ISBN 0-8153-4138-5
Nei M, Kuma, S. Molecular Evolution and Phylogenetics. Oxford University Press. 2000. 333 p. ISBN 978-0195135855
Lemey P, Salemi M, Vandamme A-M. The Phylogenetic Handbook: A Practical Approach to Phylogenetic Analysis and Hypothesis Testing / Edition 2. Cambridge University Press. 2009. 750 p. ISBN 978-0521730716
Manuals for used software and online tools

Course language:

Notes:

Course assessment
Total number of assessed students: 75

A	B	C	D	E	FX
96.0	4.0	0.0	0.0	0.0	0.0

Provides: RNDr. Jana Kisková, PhD.

Date of last modification: 01.08.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/BEX/23	**Course name:** Botanical excursion I.

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 3 **Per study period:** 42
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
Completion of all practicals, completion of an excursion, plant determination test

Learning outcomes:
After completing the subject, the student should have some orientation skills in the field and practically apply the given knowledge and methods in field work. Emphasis is placed on the correct determination of biotopes, the search for selected groups of plants in nature, their determination, collection and determination in practice. Students will become familiar with the flora of the selected area and practical examples of species protection, the spread of invasive species and various botanical problems in natural and synanthropic habitats.

Brief outline of the course:
1. Basic methods of field work I.
2. Basic methods of field work II.
3. Working with maps, orthophoto maps.
4. Determining habitats in practice I.
5. Determining biotopes in practice II.
6. Mapping in practice I.
7. Mapping in practice II.
8. Mapping in practice III.
9. Practical application of theoretical knowledge
10. Determination by keys vs. determination according to the atlas (application) in field
11. Basic methods of collection and conservation of plants. Basic methods of preserving and transporting plant material.
12. Field data processing in practice.

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 0

abs	n
0.0	0.0

Provides: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat., RNDr. Matej Dudáš, PhD., doc. RNDr. Michal Goga, PhD., Mgr. Vladislav Kolarčik, PhD., univerzitný docent, prof. RNDr. Martin Bačkor, DrSc.

Date of last modification: 24.02.2023

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ BEX2/23	**Course name:** Botanical excursion II.
Course type, scope and the method: **Course type:** Practice **Recommended course-load (hours):** **Per week:** 3 **Per study period:** 42 **Course method:** present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course:	
Course level: II.	
Prerequisities:	
Conditions for course completion: Completion of all practicals, completion of an excursion, plant determination test	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	

abs	n
0.0	0.0

Provides: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat., prof. RNDr. Martin Bačkor, DrSc., RNDr. Matej Dudáš, PhD., doc. RNDr. Michal Goga, PhD., Mgr. Vladislav Kolarčik, PhD., univerzitný docent
Date of last modification: 24.02.2023
Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ BFR/14	**Course name:** Botany and Plant Physiology

Course type, scope and the method:
Course type:
Recommended course-load (hours):
Per week: Per study period:
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 36

A	B	C	D	E	FX
38.89	19.44	25.0	8.33	5.56	2.78

Provides:

Date of last modification: 17.02.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ BMR/20	**Course name:** Carnivorous plant biology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
1. Attending lectures is optional, participation in exercises is mandatory
2. Handing over the developed protocols from practicals constitutes 20% of the grade
3. The oral exam consists of 1 main question and 4 additional questions.

Learning outcomes:
Students will become familiar with carnivorous plants, current knowledge and trends in the research of these plants. The lecture will cover areas related to physiology, ecology, biogeography, genetics and systematic classification of carnivorous plants As part of the course, students will practically get to know carnivorous plants cultivation in in vitro conditions.

Brief outline of the course:
1. Carnivorous syndrome - "definition"
2. Description of trap structures and functions
3. Digestive enzymes of carnivorous plants
4. Presence of microorganisms in carnivorous plants, leaf dimorphism, parasitism
5. Species richness, overview of families, genera and species
6. Ecology and biogeography of carnivorous plants
7. Ecophysiology of aquatic carnivorous plants
8. Carnivorous plants in the Czech Republic and Slovakia
9. Cultivation of carnivorous plants, basic procedures
10. Application of physiological knowledge in cultivation
11. Genetics and breeding
12. Current trends in carnivorous plant research
13. Acquaintance with the carnivorous plants collection in the greenhouses of the Botanical Garden in Košice, demonstration of carnivorous plants cultivation and propagation

Recommended literature:
Aaron Ellison, Lubomír Adamec, 2017: Carnivorous plants: Physiology, Ecology and Evolution, Oxford

Course language:
slovak, english

Notes:

Course assessment
Total number of assessed students: 10

A	B	C	D	E	FX
100.0	0.0	0.0	0.0	0.0	0.0

Provides: RNDr. Michaela Bačovčinová, PhD.

Date of last modification: 01.08.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ CRO1/03	**Course name:** Chronophysiology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: distance, present

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

Conditions for course completion:
Active participation on practicals.
Passing of the final oral examination.

Learning outcomes:
To outline the problematics of the time organization of biological processes and their significance in evolution of living organisms.
To understand the mechanisms, ensuring the adaptation to regular changes in their environment with various periodicity, as well as of the common action of external and internal factors in control of the biological rhythms..

Brief outline of the course:
1. Time structure of the physiological variables in animals.
2. Overview of the history of chronobiology.
3. Basic notions and division of biological rhythms.
4. Genetic basis and molecular mechanisms of the biological rhythms in animals.
5. Endogenous character of the biological rhythms. Localization of the biological clock.
6. Synchronsation of rhythms. Multioscillatory system of the body.
7. Model animals in study of biological rhythms.
8. Ultradian rhythms.
9. Circaannual (seasonal) rhythms.
10. Application of chronobiological principles in medicine.
11. Disturbations of the biological rhythms. The jet-lag syndrome.
12. Biological rhythms in shift-work.
13. The significance of biological rhythms in the evolution of living organisms.

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 118

A	B	C	D	E	FX	N	P
22.88	21.19	26.27	9.32	3.39	0.0	0.0	16.95

Provides: RNDr. Natália Pipová, PhD.

Date of last modification: 21.09.2021

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/KK/07	**Course name:** Communication and Cooperation

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities:

Conditions for course completion:
Evaluation:
A condition for student evaluation is his active participation in the seminar. It is expected that the student will actively participate in the discussions and will express their positions and possible solutions.
The output for evaluation will be the development of a project in the form of a Power Point presentation or a video on a selected communication topic.

Learning outcomes:
The goal of the subject Communication, cooperation is the formation and development of students' language and communication skills through experiential activities.
The student can demonstrate an understanding of individual behavior in various communication contexts.
The student can describe, explain and evaluate communication techniques (cooperation, assertiveness, empathy, negotiation, persuasion) in practical contexts.
The student can apply these techniques in common communication schemes.

Brief outline of the course:
Communication
Communication theory
Non-verbal communication and its means
Verbal communication (basic components of communication, language means of communication) about active listening
Empathy
Short conversation and effective communication (principles and principles of effective communication)
Cooperation
About the basics of cooperation
About types, signs, types and factors of cooperation
Characteristics of the team (positions in the team)
Small social group (structure, development, characteristics of a small social group, position of the individual in the group)

About leadership (characteristics of the leader, management, leadership styles)

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 281

abs	n	z
98.22	1.78	0.0

Provides: Mgr. Ondrej Kalina, PhD., Mgr. Lucia Barbierik, PhD.

Date of last modification: 12.09.2024

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/CK1/03	**Course name:** Cytogenetics and Karyology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 1 / 2 **Per study period:** 14 / 28
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

Conditions for course completion:
written tests, oral examination;
Practicals: The protocols and worksheets from the practical activities or distance learning are required. The e-learning course UBEV/Cytogenetika a karylógia is available in Moodle.

Learning outcomes:
To gain knowledge and experience on genetic processes at the cell level using the newest scientific findings of cytogenetics. To get acquainted in detail with the results and significance of human genome mapping (HUGO project).

Brief outline of the course:
Organisation of eukaryotic genome. Nuclear skeleton. Nucleolus, nucleolar skeleton. Chromatin structure and changes of chromatin. Levels of DNA organisation in cell nucleus. Chromosomes. Cell cycle. Genetic regulation of a cell cycle. Molecular cytology. Basic characteristics of the Human genom project - what we can learn from it?

Recommended literature:
Alberts, B., Heald, R., Hopkin, K., Johnson, A., Morgan, D., Roberts, K., & Walter, P. (2022). Essential Cell Biology (6. vydanie). W. W. Norton & Company. ISBN: 978-1-324-03343-1
Liehr, T. (2021). Cytogenomics. Elsevier, Academic Press. ISBN: 978-0-12-823579-9
Snustad, P.D., Simmons, M.J.: Principles of Genetics. John Wiley and Sons, 5th edition 2009, 871 pp.
Periodicals
Internet sources

Course language:

Notes:

Course assessment
Total number of assessed students: 1725

A	B	C	D	E	FX	N	P
24.87	14.67	15.71	14.61	18.09	11.25	0.0	0.81

Provides: doc. RNDr. Katarína Bruňáková, PhD., RNDr. Miroslava Bálintová, PhD., RNDr. Jana Henzelyová, PhD.
Date of last modification: 04.02.2025
Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ DNR/06	**Course name:** Dendrology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
1. Attending lectures is optional, participation in exercises is mandatory. 2. During the exercises, it is necessary to master the recognition of selected trees and shrubs in their various phenological phases according to significant identifying features (buds, bark, shape of leaves and flowers, habitus) and some species-specific features (cork wings, thorns, prominent pubescence, distinctive color of shoots in winter, etc.). 3. Within the framework of forest tree seed production, it is necessary to master the identification of fruits and seeds of selected taxa of woody plants.

Learning outcomes:

Brief outline of the course:
1. Summary of basic terms within the subject Dendrology. 2. Individual variability of woody plants (morphological, biochemical, biological, technical forms). 3. Geographic variability of woody plants (climate type, edaphotype). 4. Individual ecological requirements of woody plants with a basic overview of taxa (woody plants in shade and sunny conditions, oceanic and continental climate). 5. Special communities of woody plants, their characteristics and overview of the most important taxa. Pioneer woody plants, melioration woody plants, woody plants in ravines and scree, forest-steppe woody plants, floodplain woody plants, peatland woody plants and woody plants of upper forest border. 6. Saving the gene pool of forest trees (generative and clone seed orchards, selected trees and stands). 7. Selected chapters from the seed production of forest trees (external and internal factors of seed production, methods of collecting and technology of seed processing and its subsequent storage). 8. Selected chapters from forest tree seed production (seed lifespan, short-term and long-term seed storage, germination ability and germination process, methods of pre-sowing seed preparation). 9. Introduction of woody plants - definition of the term, phases of introduction. Benefits of introduction and possible environmental risks. 10. Invasive trees, overview and characteristics of the most important taxa. Ecological, economic and health consequences of invasions. 11. The most important dendrological objects in Slovakia (Mlyňany Arboretum, Borová hora Arboretum, Kysihýbel Arboretum, Topoľčianky Castle Park). 12. Introduction to arboriculture, protection and care of trees growing outside the forest. The exercises are aimed at practical recognizing the most important coniferous and deciduous both native and introduced trees. During the summer semester, dealing with woody plants in the winter (in a sterile state), the specific characteristics of woody plants (general habitus of the wood, buds, thorns, specific color of the

surface of the branch, pubescence, cork lamellas, etc.). During the growing season, recognizing the shape of the leaves and flowers..

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 83

A	B	C	D	E	FX
72.29	13.25	7.23	7.23	0.0	0.0

Provides: Ing. Peter Kelbel, Dr.

Date of last modification: 19.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ DPO/22	**Course name:** Diploma Thesis and its Defence

Course type, scope and the method:
Course type:
Recommended course-load (hours):
Per week: Per study period:
Course method: present

Number of ECTS credits: 16

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
The diploma thesis is the result of the student's own creative work. It must not show elements of academic fraud and have to meet the criteria of proper research practice defined in Rector's Decision no. 21/2021, which establishes the rules for assessing plagiarism at the Pavol Jozef Šafárik Univesity in Košice and its components. The fulfillment of the criteria is verified mainly in the training process and in the process of defending the thesis. Failure to comply with them is grounds for initiation of disciplinary proceedings.

Learning outcomes:
With the diploma thesis, the student demonstrates mastery of the extended theory and professional terminology of the field of study, the acquisition of knowledge, skills and competences in accordance with the declared profile of the graduate of the study program, as well as the ability to apply them in an original way when solving the selected problem of the field of study. The student will demonstrate the ability of independent professional work from a content, formal and ethical point of view. Further details of the diploma thesis are determined by Directive no. 1 /2011 on the basic requirements of the final theses and the Study Regulations of the UPJŠ in Košice for 1st, 2nd and combined 1st and 2nd degrees.

Brief outline of the course:
The student carries out his activities under the guidance of the supervisor. The result of the student's work should be the fulfillment of the objectives stated in the approved thesis assignment.

Recommended literature:
Mentioned in the approved thesis assignment.

Course language:

Notes:

Course assessment
Total number of assessed students: 48

A	B	C	D	E	FX
54.17	25.0	12.5	6.25	2.08	0.0

Provides:
Date of last modification: 31.07.2022
Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ EMK/15	**Course name:** Environmental Microbiology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

Conditions for course completion:
Attendance of practicals (at least 90%), final oral examination

Learning outcomes:
To provide students data on participation of microorganisms in biosphere processes, characteristics of most frequently occuring microbial communities and interactions ofmicroorganisms with other organisms.

Brief outline of the course:
Evolution and biodiversity of microorganisms, microorganisms in environment, the influence of abiotic factors on microorganisms, biogeochemical cycles, interactions between microorganisms and other organisms

Recommended literature:
1. BERTRAND, Jean-Claude, et al. (ed.). Environmental microbiology: fundamentals and applications. Dordrecht: Springer, 2015.
2. MITCHELL, Ralph; GU, Ji-Dong (ed.). Environmental microbiology. John Wiley & Sons, 2010.
3. HUDECOVÁ, D.: Mikrobiológia 1. Bratislava: STU, 2002.
4. SCHMIDT, Tom. Topics in ecological and environmental microbiology. Elsevier, 2012.
5. SIGEE, David. Freshwater microbiology: biodiversity and dynamic interactions of microorganisms in the aquatic environment. John Wiley & Sons, 2005.
6. VAN ELSAS, Jan Dirk, et al. Modern soil microbiology. CRC press, 2006.

Course language:

Notes:

Course assessment
Total number of assessed students: 96

A	B	C	D	E	FX	N	P
62.5	16.67	1.04	0.0	2.08	1.04	0.0	16.67

Provides: doc. RNDr. Peter Pristaš, CSc., univerzitný profesor, RNDr. Lenka Maliničová, PhD.

Date of last modification: 23.06.2022
Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ ETO1/03	**Course name:** Ethology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 6

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
Fulfilled conditions for the exercises
Successfully completed oral exam

Learning outcomes:
To teach the students to know and to be aware of the importance of the behavioural aspect in biological sciences

Brief outline of the course:
History and development of ethology. Ethological methods. The innate forms of behaviour. The simplest forms of learning – conditioning and instrumental learning. Higher form of learning. Social behaviour. Sexual behaviour. Play behaviour. Biological rhythms. Orientation in space and animal migrations. Communication systems of animals. Emotions. Aggression in animal and human behaviour. Abnormal forms of behaviour

Recommended literature:
Franck, D.: Verhaltensbiologie. Einfuhrung in die Ethologie. Georg Thieme-Verlag, 1993
Manning, A., Dawkins, M. S.: An introduction to animal behaviour. Cambridge University Press, 1992
DRICKMER, L.C., VESSEY, S.H., MEIKLE, D. Animal Behavior: mechanisms, ecology, evolution. 4th ed. Dubuque : Wm. C. Brown Publishers, 1996.
Internet

Course language:

Notes:

Course assessment
Total number of assessed students: 1131

A	B	C	D	E	FX
43.32	24.31	22.81	7.87	1.59	0.09

Provides: RNDr. Igor Majláth, PhD., RNDr. Natália Pipová, PhD.

Date of last modification: 22.09.2023

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ EB1/99	**Course name:** Evolutionary Biology

Course type, scope and the method:
Course type: Lecture
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities:

Conditions for course completion:
In the written exam, the student must demonstrate, in addition to knowledge in the field of evolutionary biology, knowledge of analytical and synthetic thinking when solving the answers to problem-formulated questions, while using knowledge from the entire bachelor's and master's studies of his field.

Learning outcomes:
Graduates of the course will gain an overview of evolutionary theories in the past and today, and based on the most modern scientific knowledge about macro- and microevolutionary processes in living nature at various levels of investigation and knowledge, they should be able to analytically solve scientific, but also philosophical questions in the field of evolutionary theory. He is able to argue and critically evaluate different views on evolution and apply his knowledge in different types of work tasks not only in an academic environment, but also in practice, e.g. in agriculture, ecology, environmental protection and the like.

Brief outline of the course:
1. Introduction to evolutionary biology. Historical development of ideas about the evolution of life. Evidence of the theory of evolution.
2. The origin and evolution of the first forms of life on Earth.
3. Theory of natural selection.
4. Molecular evolution I: Evolutionary processes at the gene level. Molecular evolution.
5. Molecular evolution II: Evolutionary processes at the level of species and populations.
6. Molecular evolution III: Evolution of genetic systems.
7. Reproductive strategies of plants, sexuality, asexuality and evolution.
8. Macroevolution and microevolution. Types of speciation. Evolutionary trends of green plants.
9. Extinction - a sad but natural part of evolution.
10. Overview of animal evolution.
11. Origin and development of man I.
12. Origin and development of man II.

Recommended literature:
Mayr, E.: Co je evoluce. Aktuální pohled na evoluční biologii. Academia Praha, 2009.
Flegr, J.: Evoluční biologie. Academia Praha 2005

Kejnovský, E., Hobza, R.: Evoluční genomika. (http://www.evolucnigenomika.cz/Skripta/Evolucni%20genomika%20skripta%202008.pdf) 2009
Futuyma, D.J.: Evolution. Sinauer Associates, Sunderland, 2005.
Briggs D., Walters S. M.: Proměnlivost a evoluce rostlin. Univerzita Palackého, Olomouc, 2001.
Dobzhansky T. et al.: Evolution. San Francisco 1977.
E.J.Larson : Evolúcia. Neobyčajná história jednej vedeckej teórie. Slovart, 2006.

Course language:

Notes:

Course assessment
Total number of assessed students: 675

A	B	C	D	E	FX
12.0	22.22	25.33	24.0	14.96	1.48

Provides: prof. RNDr. Pavol Mártonfi, PhD., prof. RNDr. Ľubomír Kováč, CSc., RNDr. Linda Petijová, PhD., Priv.-Doz. Souvik Kusari, Dr. rer. nat., univerzitný profesor

Date of last modification: 24.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ FLS/19	**Course name:** Flora of Slovakia

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 1 / 1 **Per study period:** 14 / 14
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course: 1., 3.

Course level: II.

Prerequisities:

Conditions for course completion:
Exam done more than 60%.
The excursion is a half-day, focused on the flora of the selected area. Completing the excursion is a condition for participation in the exam.

Learning outcomes:
Get an overview of plant groups and species growing in Slovakia. Get to know in more detail the diversity of selected groups of plants in relation to the territory of Slovakia. Ability to recognize the most important local species, families and communities of plants.

Brief outline of the course:
1. Phytogeographical division of Slovakia. Methods of mapping of the species and biotopes. Phytocoenological relevés. Vertical and horizontal vegetation levels. Types of biotopes. Herbarium collections in Slovakia.
2. Diversity of waters and terrestrial ferns.
3. Diversity of selected genuses of Ranunculaceae, Hypericaceae, Apiaceae, Violaceae.
4. Campanulaceae, Boraginaceae, Fabaceae, Fagaceae
5. Lamiaceae, Scrophulariaceae, Brassicaceae, Rosaceae
6. Orchidaceae, Iridacea
7. Asteraceae
8. Grasses and grasses-like groups from Poaceae, Juncaceae, Cyperaceae, Typhaceae
9. Forests and forest flora. Flora of lowland rivers.
10. Mountain flora. Ruderal flora. Segetala flora. Flora of meadows and pastures.
11. Bogs. Saline sites. Peat-bogs. East-carpathian endemics
12. Alien species. Invasions. Field course. Mapping in the field.

Recommended literature:

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 14

A	B	C	D	E	FX
7.14	35.71	35.71	14.29	7.14	0.0

Provides: RNDr. Matej Dudáš, PhD., prof. RNDr. Pavol Mártonfi, PhD.

Date of last modification: 11.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/FG/14	**Course name:** Functional Genomics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

Conditions for course completion:
Full-time form of practical teaching: active participation in practicals, practical courses protocols, written exam. In case of distance learning: active participation in practicals (the online method) using the MOODLE course UBEV/FG/14 Funkčná genomika, practical courses protocols, written exam.

Learning outcomes:
Functional genomics attempts to answer questions about the function of DNA at the levels of genes, RNA transcripts, and proteins. A key characteristic of functional genomics studies is their genome-wide approach to these questions, generally involving high-throughput methods rather than a more traditional "gene-by-gene" approach. The outcome of this course will be understanding of the approaches and methods used in functional genomics and their application in research as well as in practice.

Brief outline of the course:
• Introduction to functional genomics, Biological databases and other resources for functional genome analysis, A real-case applications of the functional genomics
• Genome and functional genomics: sequenced model organisms, conceptual and methodological input of genome sequencing, structural vs. functional genome annotation
• Genome-wide reverse genetics: techniques to create collections of genome-wide mutants and their use in functional genomics
• Transcriptomics: methods to obtain transcriptome data, in silico processing of transcriptomic data, differential expression
• Proteomics: methods to obtain proteome data, quantitative vs. qualitative proteomics, data analysis, data mining
• Metabolomics: methods to obtain metabolomic data, quantitative vs. qualitative metabolomics, data analysis, data mining
* Interactomics - protein networks, methods in interactome and signalome studies, data analysis, practical use of the acquired knowledge on interactome and signalome

Recommended literature:
J. Pevsner: Bioinformatics and Functional Genomics, 3rd Edition, ISBN: 978-1-118-58178-0
Internet sources

Course language:
English

Notes:

Course assessment
Total number of assessed students: 165

A	B	C	D	E	FX	N	P
17.58	28.48	26.67	10.3	13.33	1.21	0.0	2.42

Provides: doc. RNDr. Katarína Bruňáková, PhD., RNDr. Linda Petijová, PhD., RNDr. Miroslava Bálintová, PhD., doc. MVDr. Mangesh Ramesh Bhide, PhD.

Date of last modification: 04.02.2025

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ GB1/03	**Course name:** Geobotany

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
1. Active participation in field exercises.
2. Elaboration of a semester's work (recording in the field, species herbarium of detected vascular plants, classification at the class level and the reasons that conditioned it, brief comparison with similar communities based on the literature)
3. Written examination in the form of a test, which must be completed with at least 50%.

Learning outcomes:
Get an overview of the classification of vegetation, the distribution of plants and the relationships between plants. Get a basic idea of the practical use of this knowledge in botany, ecology and nature conservation. To teach students to take field notes and process them.

Brief outline of the course:
1. basic information about phytocenology, its goals
2. brief history of phtocenology, basic terms and literature
3. Zurich-Montpellier school, methodological foundations, data collection
4. analysis of the obtained phytocenological data (principles, database and statistical programs used in phytocenology),
4. phytocenological nomenclature code.
5. ecological assessment of vegetation (indirect indication vs directly measured/obtained data).
6. syntaxonomic and ecological assessment of basic biotopes in the Central European area
7. pioneer vegetation,
8. synanthropic vegetation
9. Vegetation of wetlands
10. alpine vegetation,
11. herbaceous vegetation
12. Vegetation of forests and bushes
13. examples of phytocenological case studies and the use of phytocenology in practice.

Recommended literature:
Dengler, J., Chytrý M., Ewald, J., 2008: Phytosociology. In: Sven Erik Jørgensen and Brian D. Fath (Eds), General Ecology. Vol. [4] of Encyclopedia of Ecology, pp. 2767-2779. Elsevier, Oxford.

Moravec, J. a kol: Fytocenologie, Academia Praha, 1994.
Weber, H. E., Moravec, J. & Theurillat, J.-P. 2000. International Code of Phytosociological Nomenclature. 3rd edition. – J. Veg. Sci. 11: 739–768.
Valachovič M. a kol., 1995: Rastlinné spoločenstva Slovenska 1. Pionierska vegetácia. Veda, Bratislava.
Jarolímek I. a kol., 1997: Rastlinné spoločenstva Slovenska 2. Synantropná vegetácia. Veda, Bratislava.
Valachovič M. a kol., 2001: Rastlinné spoločenstva Slovenska 3. Vegetácia mokradí. Veda, Bratislava.
Kliment J., Valachovič, M. a kol., 2007: Rastlinné spoločenstva Slovenska 4. Vysokohorská vegetácia. Veda, Bratislava.
Hegedüšová Vantarová, K., Škodová, I. a kol., 2014: Rastlinné spoločenstva Slovenska 5. Travinno-bylinná vegetácia. Veda, Bratislava.
Chytrý, M. a kol., 2013: Vegetace České republiky 4. Lesní a křovinová vegetace. Academia, Praha.
Chytrý, M. a kol., 2010: Katalog biotopů České republiky. AOPK, Praha.
Stanová, V., Valachovič, M. a kol., 2002: Katalóg biotopov Slovenska. DAPHNE, Bratislava.

Course language:

Notes:

Course assessment
Total number of assessed students: 42

A	B	C	D	E	FX
52.38	23.81	21.43	2.38	0.0	0.0

Provides: Ing. Richard Hrivnák, PhD.

Date of last modification: 30.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚGE/ GDPZ/18	**Course name:** Geographical Information Systems and Remote Sensing

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
EN
Successful study of this subject assumes active presence on the practicals and passing 2 practical tests reaching at least the mark E (50 points out of 100). The tests are performed in the mid-term and end of the semester.

Learning outcomes:
Knowledge: Students will acquire basic knowledge about the theoretical and methodological aspects of geographic information systems and remote sensing methods, an overview of the methods of acquisition, processing, distribution and analysis of geographic data and the possibilities of their application in environmental practice;
Skills: Practical skills in software processing of geographic data in GIS, spatial analysis and cartographic visualization; they will also acquire the basics of principles and applications of remote sensing methods, processing of multispectral satellite images, calculation of spectral indices and image classification, processing of lidar data.
Competences: Ability to independently design a project for solution in GIS, including suitable digital representation of objects in the country, methods of data collection, processing and spatial analysis, ability to present written and graphic work of own and team work. Orientation in the selection of suitable RS methods for environmental applications.

Brief outline of the course:
Lectures: Main areas of application of geographic information systems and remote sensing of the Earth in practice. Used hardware, software, availability of digital spatial data. Principles of digital representation of territory in GIS (raster, vector format), coordinate systems. Principles of DPZ methods. Data collection in the field using GPS, UAV, laser scanning. Scanning of existing maps and georeferencing. Basic principles of creation of cartographic outputs - creation of thematic maps in GIS. Maps on the Internet, Google Maps, Google Earth, OpenStreetMaps.
Exercises: Basic presentation and control of the ArcGIS program, working with files, working with an attribute table, importing/exporting data, defining a coordinate system, principles of representing point, line and area phenomena, creating map outputs. Work with GPS, UAV and terrestrial laser scanning devices, basic processing of multispectral satellite scenes.

Recommended literature:

HOFIERKA, J., KAŇUK, J., GALLAY, M. 2014: Geoinformatika. Univerzita Pavla Jozefa Šafárika v Košiciach, 192 s.
KAŇUK, J., 2015: Priestorové analýzy a modelovanie. Vysokoškolské učebné texty. Prírodovedecká fakulta Univerzity Pavla Jozefa Šafárika v Košiciach. 114 s.
SEDLÁK, V., 2017: Globálne navigačné satelitné systémy. Vysokoškolské učebné texty. Prírodovedecká fakulta Univerzity Pavla Jozefa Šafárika v Košiciach. 157 s.
TUČEK, J. 1998: Geografické informační systémy – principy a praxe. Computer Press, Praha. 424 s.
ŽELEZNÝ, M. (2012): Dálkový průzkum Země (skriptá), Západočeská univerzita v Plzni, Katedra kybernetiky. 93 s. URL: http://www.kky.zcu.cz/uploads/courses/dpz/DPZ-prednasky.pdf
CANADIAN CENTRE FOR REMOTE SENSING (2012): Fundamentals of Remoste Sensing (učebný text v angličtine, in English), 256 s. URL: http://www.nrcan.gc.ca/earth-sciences/geography-boundary/remote-sensing/fundamentals/1430.
LONGLEY, P. A., GOODCHILD, M. F., MAGUIRE, D. J., RHIND, D. W. 2001: Geographic Information Systems and Science. John Wiley & Sons.
LONGLEY, P. A., GOODCHILD, M. F., MAGUIRE, D. J., RHIND, D. W. 1999: Geographical Information Systems: Principles, Techniques, Management and Applications. John Wiley & Sons.
WILSON, J. P., FOTHERINGHAM, A. S. 2008: The Handbook of Geographic Information Science. Blackwell Publishing

Course language:
Slovak or English

Notes:

Course assessment
Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: doc. Mgr. Michal Gallay, PhD.

Date of last modification: 12.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ LR1/03	**Course name:** Healing Plants

Course type, scope and the method:
Course type: Lecture
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:
1. Participation in an excursion in the area of the Botanical Garden focused on practical demonstrations of medicinal plants, methods of their cultivation and collection.
2. Written exam, which must be passed at least 50%.

Learning outcomes:
Get an overview of the most important medicinal plants in Slovakia. Students will learn to identify medicinal plants. In addition, they will learn about the possibilities of growing medicinal plants, the substances contained in these plants and their practical use.

Brief outline of the course:
Introduction to the study of medicinal plants.
Production, processing and preservation of medicinal plants.
Collection of medicinal plants
Secretory structures of plants
Synthesis of biologically active metabolites in plants - secondary metabolism
Classification of constituents and their effects
Medicinal plants from the families Papaveraceae, Droseraceae, Hypericaceae, Rosaceae
Medicinal plants from the families Malvaceae, Ericaceae.
Medicinal plants from the families Scrophulariaceae, Plantaginaceae, Lamiaceae.
Medicinal plants from the families Caprifoliaceae, Apiaceae, Valerianaceae.
Medicinal plants from the families Asteraceae, Equisetaceae, Ginkgoaceae.
Practical use of medicinal plants.
Poisonous plants.

Recommended literature:

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 464

A	B	C	D	E	FX
31.25	26.08	18.53	9.7	7.54	6.9

Provides: RNDr. Matej Dudáš, PhD.

Date of last modification: 10.03.2025

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ IMU1/03	**Course name:** Immunology

Course type, scope and the method:
Course type: Lecture
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
Recognition.
Oral examination.

Learning outcomes:
This course introduces the students to the basic concepts of immunology as well as highlights the role and importance of immunology in various human diseases. The aim of Immunology lessons is the presentation of the organization and function of the immune system, as well as the comprehension of complex molecular and cellular interactions during the induction of immune responses.

Brief outline of the course:
Basic immunology: Lymphatic System Anatomy, The Innate Immune System, The Induced Responses of Innate Immunity, The Adaptive Immune Response, Antigens and Antibodies, Antigen Recognition by B-cell and T-cell Receptors, Antigen Presentation to T-lymphocytes, Complement, Clinical immunology: Allergy and other Hypersensitivities, Autoimmunity and Transplantation, Tumor Immunology, Disorders of The Immune System.

Recommended literature:
Janeway Ch. A., Travers P., Walport M., Schlomchik M.: Immunobiology. Garland Science, 2004
Murphy, K. (2012): Jeneway's Immunobiology. 8th ed. Garland Science
Delves, P.J. et al. (2011): Roitt's essential immunology 12th ed Wiley-Blackwell

Course language:

Notes:

Course assessment
Total number of assessed students: 1087

A	B	C	D	E	FX
40.02	23.83	23.64	6.99	1.93	3.59

Provides: RNDr. Vlasta Demečková, PhD., univerzitná docentka

Date of last modification: 22.09.2023

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ UGM1/03	**Course name:** Introduction to Gene Manipulations

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 6

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
Active participation in seminars - elaboration of assignments and protocols for practical exercises completed by continuous assessment (30% of the total assessment), written examinations of the content of lectures (60% of the total assessment), oral exam (10% of the total assessment).

Learning outcomes:
To provide the students with the principles of preparation and application of techniques of recombinant DNA.

Brief outline of the course:
Overview of the basic structure and functioning of biomolecules (proteins, nucleic acids), basic concepts and chemical principles applied to biological systems (water as a solvent, buffers, pH), general laboratory techniques (buffer preparation, centrifugation, dialysis, lyophilization).
Enzymes used in gene manipulation (nucleases, restriction endonucleases, lysozyme, proteinases, etc.). Cell lysis methods. Principles of individual isolation units and tasks of individual components, isolation of genomic DNA, methods of plasmid isolation, isolation of DNA from different cell types, isolation and specifics of work with RNA molecules. Electrophoretic techniques (agarose and polyacrylamide, resolution, sensitivity, voltage, color, visualization, different types of electrophoresis. Spectroscopic analysis of biomolecules (general principles, overview of methods and their principle, UV-Vis spectroscopy, MALDI-TOF). and analysis of biomolecules by chromatography.Production of proteins and their purification and characterization (preparation of cell extracts, protein stabilization, precipitation, selection of purification technique by tags) Hybridization methods (Southern, Northern, Western).

Recommended literature:
Old, R.W., Primrose, S. B.: Principles of Genetic Manipulation. An Introduction to Genetic Engineering. Blackwell Scientific Publication, London, 1992
S.B. Primrose and R.M. Twyman: Principles of gene manipulation and genomics. 7th Edition, 2006. ISBN 140513544
Fitzgerald-Hayes, M and Reichsman, F: DNA and Biotechnology. Academic Press, 2009. Third edition. ISBN 9780080916354
T.A.Brown: Gene Cloning and DNA Analysis: An Introduction. Wiley-Blackwell, 2016. 7th edition. ISBN: 978-1-119-07254-6

Course language:

Notes:

Course assessment
Total number of assessed students: 308

A	B	C	D	E	FX
61.04	28.9	7.47	1.95	0.32	0.32

Provides: RNDr. Lenka Maliničová, PhD., RNDr. Mariana Kolesárová, PhD.

Date of last modification: 31.05.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ BIL/19	**Course name:** Lichen Biology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 1., 3.

Course level: II.

Prerequisities:

Conditions for course completion:
1. 100% participation of exercises.
2. learn how to work with the key for determining lichens, practical use
3. show and demonstrate the knowledge acquired during the exercises in TLC, HPLC, NMR
4. be able to assemble the equipment necessary for the isolation of substances (e.g. secondary metabolites)
5. demonstrate theoretical knowledge in the field of lichenology in the form of an oral exam

Learning outcomes:
After successfully completing the subject, the student should be able to use the key for identification of lower plants - lichens, understand and better understand the meaning of symbioses and thus specifically lichenism, understand the meaning of photobiont and mycobiont, be able to distinguish lichen from other lower plants in nature. The student should understand the significance of the secondary metabolites of lichens, how they are formed and how they are used in practice. As part of the practical part, methods for the isolation and identification of secondary metabolites such as spot-test, TLC, HPLC should be mastered. These methods are connected with basic knowledge of chemistry such as calculations, dilutions, preparation of solutions.

Brief outline of the course:
1. introduction to the study of lichenology and concepts
2. history from antiquity to the present
3. Symbiosis and lichenism
4. the role of photobiont and mycobiont in lichenism
5. Lichen thallus, types and subtypes
6. reproduction and reproduction
7. secondary metabolism of lichens and biosynthetic pathways
8. biological and ecological role of lichens and their secondary metabolites
9. extraction of secondary metabolites of lichens
10. Methods for identification and separation of secondary metabolites: TLC (thin layer chromatography), column chromatography
11. Methods for identification: HPLC (high-performance liquid chromatography)
12. Methods for identification: NMR (nuclear magnetic resonance)

13. presentation of results from the practical part

Recommended literature:
recommended literature:
Purvis: Lichens (2000)
Ahmadjian The lichens (1973)
Nash: Lichen Biology (2008)
Ranković: Lichen secondary metabolites (2019)

Course language:
slovak, english

Notes:

Course assessment
Total number of assessed students: 21

A	B	C	D	E	FX
95.24	0.0	4.76	0.0	0.0	0.0

Provides: doc. RNDr. Michal Goga, PhD., prof. RNDr. Martin Bačkor, DrSc.

Date of last modification: 31.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KF/FMPV/22	**Course name:** Methodology of Science 1

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 1 / 1 **Per study period:** 14 / 14
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
Attendance: A student may have one unexcused absence in seminar at the most. Absence in more than one seminar must be reasoned and substituted by consultations. Conditions of continuous and final control: during the semester a student is continuously checked and assessed according to his/her activity. To be awarded the credits, a student must pass a test from knowledge obtained in the lectures and seminars. Results of the test will make up the final grade.

Learning outcomes:
The course is aimed at getting familiar with the basic issues of methodology and philosophy of science. Significant part will be devoted to presenting the main concepts of the philosophy of science in the 20th century and this aim will be achieved by reading the source and interpretive texts.

Brief outline of the course:
• Falsificationism and critical realism by K. R. Popper.
• Development and critique of the Popper's concept.
• Understanding the science development in the work by T. S. Kuhn.
• Methodology of scientific research programmes of I. Lakatos.
• Methodological anarchism of P. Feyerabend.
• W.V.O. Quine – the issue of relation between theory and empiricism.

Recommended literature:
BILASOVÁ, V. – ANDREANSKÝ, E.: Epistemológia a metodológia vedy. Prešov: FF PU 2007.
FAJKUS, B.: Filosofie a metodologie vědy. Praha: Academia 2005.
BEDNÁRIKOVÁ, M. Úvod do metodológie vied. Trnavská univerzita: Trnava 2013.
DÉMUTH, A. Filozofické aspekty dejín vedy. Trnavská univerzita: Trnava 2013.
FEYERABEND, P.: Proti metodě. Prel. J. Fiala. Praha: Aurora 2001.
KUHN, T. S.: Štruktúra vedeckých revolúcií. Prel. Ľ. Valentová. Bratislava 1982.

Course language:
Slovak

Notes:

Course assessment
Total number of assessed students: 6

A	B	C	D	E	FX
100.0	0.0	0.0	0.0	0.0	0.0

Provides: prof. PhDr. Eugen Andreanský, PhD.

Date of last modification: 01.02.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ MVR/22	**Course name:** Mineral Nutrition of plants

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:
Bhatla S.C., Lal M.A. Plant Physiology, development and metabolism. Springer Nature Singapore Pte Ltd. 2018

Course language:

Notes:

Course assessment
Total number of assessed students: 9

A	B	C	D	E	FX
66.67	22.22	11.11	0.0	0.0	0.0

Provides: doc. RNDr. Peter Paľove-Balang, PhD.

Date of last modification: 12.11.2021

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ MSR/22	**Course name:** Molecular plant systematics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities:

Conditions for course completion:
1. Active participation in practical exercises. Reasoned non-attendance may be excused by the teacher for a maximum of 2 hours (one two-hour lesson) without the need for substitute performance. In the case of longer justified absence, the teacher will suggest an alternative form of missed lesson.
2. Before the exercises, the students will study the main theses of the task that will be carried out in the given exercise. Students will receive an exact list of tasks according to individual lessons at the beginning of the semester.
3. Students make a written record of the exercises. The students will evaluate the results of the tasks from the practical exercises and draw up a conclusion. The form in which this activity will be checked is determined by the teacher at the beginning of the semester. After this check, the task is considered validly completed.
4. Exercises are considered to have been completed upon valid completion of all tasks that have been completed. The exception is excused non-participation (point 1). Completing the exercises is a condition for participation in the exam.
5. Preparation of semestral work on a topic agreed in advance with the teacher is also a condition for the completion of the course.
6. The examination of the subject takes place orally. Students choose two questions and have a max. 30 minutes to prepare. Any changes or modifications to the conditions for completing the course due to the COVID19 pandemic or other serious reasons are continuously posted on the course's electronic bulletin board.

Learning outcomes:
In the course, the student should become familiar with evolutionary processes and with various molecular methods in a broad sense, for the generation of "markers" and their analysis in plant systematics. After completing the course, the student should know the molecular patterns of different types of markers depending on evolutionary processes. The student will acquire the skills to properly design a molecular study in plant systematics, should be able to perform basic analyses of well-established molecular markers and to correctly interpret and critically evaluate the results.

Brief outline of the course:

1. DNA, nuclear genome, plastid genome, mitochondrial genome, nuclear genome size, base composition, structure. Chromosomes, monocentric and holocentric. Ploidy level of plants. Diploids - polyploids. Application of knowledge in molecular phylogenetics and phylogenomics.
2. Nuclear genome. Characteristics, variability, use of the spectrum of coding and non-coding markers in plant systematics. ITS, ETS, advantages and disadvantages of ITS. ITS conformation. ITS cloning. ITS barcode. Single copy genes.
3. Plastid genome and mitochondrial genome. The use of extranuclear DNA markers to solve questions of evolutionary history, population biology and plant systematics. Chloroplast genome, cpDNA and characteristics of selected markers. Whole-genome cpDNA sequencing and use in systematics. Mitochondrial DNA sequences and plant systematics.
4. Analysis of sequencing data of various markers. Methods, software and procedures.
5. Restriction dominant data, RAPD, RFLP, AFLP, application in plant systematics. Interpretation of fragment analysis. Molecular diversity. Advantages and disadvantages of the methods. Codominant data. Single sequence repeats (SSR markers, microsatellites).
6. Analysis of restriction data, AFLP. Analysis of microsatellites. Methods, software and procedures.
7. Molecular cytogenetics, chromosomes, karyotype, C-bands, FISH, GISH, chromosome painting in plant systematics. Flow karyotyping. The use of molecular cytogenetics in solving systematic questions.
8. Biomolecules in plant metabolism and their use in systematics. Chemodiversity. Isolation and determination of plant metabolites. Analysis and use of chemometric methods in systematics.
9. Evolutionary processes and molecular formulas in plants. Haplophasic and diplophasic plants. Genetic drift, genetic draft, evolutionary drives and related molecular patterns.
10. Molecular systematics, molecular patterns and hybridization, identification of polytopic and multiple origin of hybrids. Unidirectional and bidirectional hybridization. Paternity and maternity in gymnosperms and angiosperms. Hybrid swarms, introgression. Reticulate evolution.
11. Population "systematics". Population structure and patterns of molecular markers in relation to life strategies, reproductive modes and reproductive ecology of plants. Autogamy vs. allogamy, dioecy vs. gynodioecy vs. monoecy, sexuality vs. apomixis.
12. Phylogeography, population structure, population fragmentation. Molecular patterns and their interpretation in the identification of genetic centers and migration routes of plants.
13. Molecular phylogenomics, "Next-generation" sequencing, II generation, III generation sequencing. Techniques and principles.

Recommended literature:

Simpson M.G.: Molecular Systematics (2019)
Besse, P.: Molecular Plant Taxonomy (2016)
Olson P.D.: Next Generation Systematics (2016)
Wendel J.F.: Plant Genome Diversity, Vol. 1 (2014)
Greilhuber J.: Plant Genome Diversity, Vol. 2 (2012)

Course language:

slovak, english

Notes:

Course assessment

Total number of assessed students: 11

A	B	C	D	E	FX
0.0	27.27	36.36	27.27	0.0	9.09

Provides: Mgr. Vladislav Kolarčik, PhD., univerzitný docent
Date of last modification: 30.07.2022
Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KF/ FILA/22	**Course name:** Philosophical Antropology

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 0

A	B	C	D	E	FX
0.0	0.0	0.0	0.0	0.0	0.0

Provides: doc. PhDr. Kristína Bosáková, PhD.

Date of last modification: 01.02.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ FRV1/22	**Course name:** Physiology of Plant Growth and Development

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
1. Attending lectures is mandatory, participation in practicals is also mandatory
2. Handing over the developed protocols from practicals constitutes 20% of the grade
3. Preparation of a written test consisting of 70 questions (min. 60%)

Learning outcomes:
To learn about basic methods and approaches in physiology of plant growth and development.
The student will learn the basic concepts related to plant development and deepen the basic knowledge about the regulation of individual processes. They will get acquainted with signal transmission in plants and the influence of various factors (light, phytohormones, ...) on the growth and development of plants at various levels.
During the exercises, the student should master the basic preparation of growth media, work with a microscope and evaluate the results obtained.

Brief outline of the course:
1. Growth and morphogenesis: growth phases and kinetics; cell wall, differentiation.
2. Photoreceptors of red and blue light.
3. Hormones: metabolism and transport; mechanism and physiological effects;
4. Auxins, gibberellins,
5. Cytokinins, abscisic acid, ethylene
6. Brassinosteroids, jasmonic acid and strigolactone.
7. Polarity. Apical dominance. Regeneration and transplantation.
8. Biological rhythms, molecular clock mechanism
9. Dormancy. Germination.
10. Flowering induction: expression, determination, photoperiodism
11. Development of floral organs.
12. Aging and programmed cell death.
13. Orientation in space: phototropism, gravitropism and nastic movements.

Recommended literature:
Taiz L., Zeiger E., Plant physiology. Fifth edition. Sinauer ass., Sunderland 2010
Taiz L, Zeiger E, ed. 2018 Plant physiology and development, 6th editon, Oxford

Course language:

Notes:

Course assessment
Total number of assessed students: 5

A	B	C	D	E	FX
40.0	60.0	0.0	0.0	0.0	0.0

Provides: Ing. Robert Gregorek, PhD., RNDr. Michaela Bačovčinová, PhD.

Date of last modification: 31.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ FG1/03	**Course name:** Phytogeography

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 1 **Per study period:** 28 / 14
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:
1. Lectures are optional, but highly recommended due to the presentation of otherwise difficult-to-access information and its synthesis.
2. In addition to the exam, the student must complete a mandatory 5-hour field trip focusing on the aspects that determine the spread of plants on Earth, solve practical tasks from the topic of the subject and prepare a semester presentation on the given topic, the presentation is defended at a scientific mini-conference.

Learning outcomes:
After completing the subject, the student is oriented in various aspects of phytogeographic issues and can apply the acquired knowledge both in basic research within chorology, historical and regional phytogeography, as well as in the evaluation of world biomes. The practical application of the subject is within the study of geographically and climatically conditioned changes in vegetation, in the assessment of the reduction of biodiversity and the extinction of the natural plant communities of the Earth, and the acquired knowledge can be used in work in environmental protection.

Brief outline of the course:
1. History of the subject. Plants and environment. Dynamics of the earth's surface.
2. Abiotic and biotic factors of the plant environment.
3. Chorology, range, areal disjunctions, relics, endemism, vicarism.
4. Elements of flora - older and newer approaches.
5. Main features of florogenesis. Paleozoic, Mesozoic, Cenozoic.
6. Main features of florogenesis. Cenozoic - Pleistocene, Holocene.
7. Basics of GIS (geographic information systems) and their use in botanical research.
8. Postglacial development of vegetation in Slovakia.
9. Current changes in terrestrial vegetation and their study, plant invasions.
10. Geography of vegetation: from tropical rainforests to tundra I.
11. Geography of vegetation: from tropical rainforests to tundra II.
12. Geographical origin of cultivated plants.
Seminars and exercises consist of a 5-hour excursion focusing on the connections and conditionality of plant distribution and indoor exercises focusing on an overview of phytogeographical literature, atlases of plant distribution and their importance, types of mapping, types of areas, practical

assessment of floristic elements and types of disjunctions , work with maps of specific taxa throughout Europe. Further: regional phytogeography of the Earth, historical overview of opinions on the phytogeographical (floristic) division of Slovakia. Plant phylogeography. Student presentations of final semester theses (phytogeographical mini-conference).

Recommended literature:

Hendrych R.: Fytogeografie. - SPN, Praha 1984.
Prach K., Štech M., Říha P.: Ekologie a rozšíření biomů na Zemi. - Scientia, Praha 2009.
Krippel E.: Postglaciálny vývoj vegetácie Slovenska. – Veda, vyd. SAV, Bratislava, 1986.
Dahl, E.: The Phytogeography of Northern Europe, - Cambridge University Press, 2007.
Brown J. H., Lomolino M. V.: Biogeography. - Sinauer Associates, Sunderland, 1998.
Myers A. A., Giller P. S.: Analytical Biogeography. - Chapman & Hall, 1990.
Various literature devoted to the geography of vegetation (mainly nature and travel), articles in National Geographic, Živa, Vesmír and other magazines.

Course language:

Notes:

Course assessment

Total number of assessed students: 404

A	B	C	D	E	FX
38.61	22.03	21.53	8.66	8.42	0.74

Provides: prof. RNDr. Pavol Mártonfi, PhD., Mgr. Vladislav Kolarčik, PhD., univerzitný docent

Date of last modification: 24.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/SBR/22	**Course name:** Plant Biology Seminar

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
Literature search training, interpretation of actual news in plant physiology, abbility to present scientific results. Increase of ability to constructively discuss scientific topics. Processing and analysis of results using statistical programs. Preparation of posters and presentations. Requirements for diploma theses.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 8

A	B	C	D	E	FX
100.0	0.0	0.0	0.0	0.0	0.0

Provides: doc. RNDr. Michal Goga, PhD., RNDr. Michaela Bačovčinová, PhD.

Date of last modification: 12.11.2021

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ BTR1/06	**Course name:** Plant Biotechnology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 3 **Per study period:** 28 / 42
Course method: present

Number of ECTS credits: 6

Recommended semester/trimester of the course:

Course level: I., II., III.

Prerequisities:

Conditions for course completion:
Active participation at the practicals, protocols, oral examination

Learning outcomes:
To gain theoretical and practical knowledge on plant tissue culture in vitro.

Brief outline of the course:
Definition and history of plant biotechnology. Aseptic techniques, culture conditions. Micropropagation, types of plant explant cultures used in biotechnology. Somatic hybridization and embryogenesis, direct and indirect organogenesis. Somaclonal varation. Secondary metabolites production, bioreactors, biotransformation, immobilization and elicitation. Genetic transformation, direct and indirect methods of transformation. Types of vectors, promotors, selection markers and reporter genes used in plant transformation. Germplasm storage, gene banks. Cryopreservation and slow growth method. Genetically modified organisms - metabolic engineering, genetic engineering, plants resistant to biotic and abiotic stresses, molecular farming, the role of tissue and organ specific plant promoters, plastome engineering, plant-based edible vaccines. RNA silencing, the application of microRNAs in plant biotechnology.

Recommended literature:
Abdin M.Z., Kiran U., Kamaluddin M., Ali A. (eds.): Plant Biotechnology: Principles and Applications. 2017, Springer Nature Singapore Pte Ltd., Singapore
Chawla H.S.: Introduction to Plant Biotechnology. 2009, third edition, Science Publisher, Enfield, USA
Periodicals and Internet sources

Course language:

Notes:

Course assessment
Total number of assessed students: 190

A	B	C	D	E	FX	N	P
40.0	17.89	13.16	10.53	11.05	2.63	0.0	4.74

Provides: RNDr. Miroslava Bálintová, PhD., RNDr. Jana Henzelyová, PhD.
Date of last modification: 02.02.2021
Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ EKR1/03	**Course name:** Plant Ecology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 6

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
1. Participation in seminars (even in the case of online teaching) Students are obliged to participate in seminars. The relevant teacher who conducts the seminar will excuse the justified non-participation of the student (inability to work, family reasons, etc.) at a maximum of two seminars during the semester without the need for substitute performance. In case of long-term justified absence (for example due to incapacity for work), the relevant teacher will determine the student's alternative form of mastering the missed material;
2. Demonstration of knowledge and expertise in the field of ecology acquired at lectures and seminars (determination of morphological and anatomical features related to environmental factors)
3. Demonstration of sufficient skills in the use of methodologies that are part of laboratory exercises
4. Pass the oral exam, which will also include a written part in the form of a short description of ecological relationships from the given picture.

Learning outcomes:
The student will understand the main relationships of plants with the environment and other organisms. He will be able to recognize the needs of plants, how plants adapt to the environment and other organisms. Based on this, he will understand the distributional and formative values of biotic and abiotic ecological conditions, as well as the linking of plants into complex plant communities, which is also related to other organisms in ecosystems. The student will be able to recognize the major biomes of the Earth and the problems that plants face, as well as what solutions or mechanisms they have developed to survive in such an environment. Finally, he will learn how the changing environment affects plant organisms and plant communities.

Brief outline of the course:
1. Plant ecology, subject, research approaches and methodology, autecology, ecology of communities
2. Factor ecology I – plants and water (drought)
3. Factor ecology II – plants and atmosphere including wind
4. Factor ecology III – plants and light
5. Factor ecology IV – plants and soil
6. Factor ecology V – plants and interactions with other organisms
7. Zonobiomes on Earth

8. tropical biomes
9. Subtropical biomes
10. Temperate climate, maritime to continental biomes
11. boreal and polar biomes
12. water biomes
13. Plants related to anthropogenic environmental changes

Recommended literature:

Breckle, S.-W. (2002). Walter's Vegetation of the Earth. Springer, 525
Schultze, E.D., Beck, E., Muller-Hohenstein, K. (2002). Plant Ecology. Springer, 702.
Gurevich, J., Scheiner, S., Fox, G. (2006). The ecology of plants, Sinauer Associated, Inc. Publishers, 522
Lambers, H., Chapin III, F.S., Pons, T.L. (1998). Plant Physiological Ecology. Springer, Berlin, 540

Course language:
slovak, english

Notes:

Course assessment
Total number of assessed students: 253

A	B	C	D	E	FX
76.28	17.0	5.53	0.79	0.4	0.0

Provides: doc. RNDr. Michal Goga, PhD., prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

Date of last modification: 31.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ER1/01	**Course name:** Plant Embryology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 1 / 1 **Per study period:** 14 / 14
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
1. Participation at the practices - work with permanent slides, work with living material, outline of the studied phenomena and their description
2. Passing the examination

Learning outcomes:
Student knows basic breeding strategies and reproduction ways of angiosperms. He/she is informed about micro- and megagametogenesis from archesporal cell up to mature gametophyte. He/she knows the origin of new organism and the processes leading to it. He/she is familiar with phenomena connected with embryo development and its relations to other parts of seeds. He/she is informed on apomixis. He/she knows the way from seed to photosyntethising plant of new generation. He/she obtains information on origin and development of the embryo of gymnosperms.

Brief outline of the course:
1. Embryology as science
2 Breeding strategies
3. Female gametophyte
4. Male gametophyte
5. Pollination, progamogenetic phase of fertilization processes
6. Fertilization, gamogenetic and postgamogenetic phase, incompatibilities
7. Embryo, general characeters and development
8. Embryo of monocotyledones and dicotyledones
9. Endosperm
10. Apomixis
11. Seed, germination of seeds
12. Embryology of gymnosperms

Recommended literature:
Erdelská O., Švubová R., Mártonfiová L., Lux A. (2017): Embryológia krytosemenných rastlín. Veda, Bratislava
Richards, A. J. (1997): Plant Breeding Systems. Chapman & Hall, London

Course language:

Notes:					
Course assessment Total number of assessed students: 121					
A	B	C	D	E	FX
36.36	28.1	18.18	10.74	6.61	0.0
Provides: RNDr. Lenka Mártonfiová, PhD.					
Date of last modification: 18.07.2022					
Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ MR1/03	**Course name:** Plant Metabolism

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 6

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities:

Conditions for course completion:
1. Active participation in laboratory practicals. Reasoned absence can be justified by the teacher for a maximum of 4 hours (one two-hour course) without the need for replacement. In the case of a longer justified absence, the teacher will determine an alternative form of mastering the missed teaching.
2. Before the practicals, students have to study the main theses of the task that will be realized. Students will receive an exact schedule of tasks according to individual lessons at the beginning of the semester.
3. Students make a written record of the practicals. Students will evaluate the resultsfrom and draw a conclusion. The form in which this activity will be checked is determined by the teacher at the beginning of the semester. After this check the task is considered validly completed.
4. Whole pacticals are considered to be finally completed upon valid completion of all tasks. The exception is the justified non-participation (point 1). Completion of practicals is obligatory before the exam.
5. The exam of the subject takes place orally. Students ask two questions and have a max. 30 minutes to prepare.
Any changes or modifications to the conditions for completing the course due to the COVID19 pandemic, or other serious reasons, are continuously published on the electronic bulletin board of the course.

Learning outcomes:
The subject significantly deepens knowledge from the bachelor's degree. The student should gain an overview of the basic biochemical processes in plants. Emphasis is placed on understanding the principles of their functioning and their significance for plants. Acquaintance of students with basic biochemical research methods of plant metabolism within the practical part. The result of education is also the ability to process and express own results.

Brief outline of the course:

Recommended literature:
Masarovičová E., Repčák M. et al. Fyziológia rastlín. 2. dopl. vydanie. Vyd. UK Bratislava 2008;
Taiz L.et al. Plant Physiology and Development. Sixth editon. Sinauer ass.,Sunderland 2014;
Repčák M. et al. Návody na cvičenia z fyziológie rastlín. 4. preprac. vyd. UPJŠ

Košice 2014
Bhatla S.C., Lal M.A. Plant Physiology, development and metabolism. Springer Nature Singapore Pte Ltd. 2018

Course language:

Notes:

Course assessment
Total number of assessed students: 127

A	B	C	D	E	FX
22.83	20.47	18.9	15.75	19.69	2.36

Provides: doc. RNDr. Peter Paľove-Balang, PhD.

Date of last modification: 31.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ IOR/09	**Course name:** Plant Protection

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities: ÚBEV/VEK1/03

Conditions for course completion:
1. Attending lectures is voluntary, participation in exercises is mandatory.
2. During the exercises, it is necessary to master the principles of collecting, labeling, storage, processing and identification of plant samples, their potential pests and other accompanying organisms visible at least with a binocular magnifying glass. The data obtained in the field and in the laboratory will be further statistically processed. Specific application procedures in plant protection will be tested according to current possibilities in the area of the P.J. Šafárik University Botanical Garden.
3. Separate processing of a model example regarding effective temperatures and their significance for the development of plant pests and pathogens.
4. Elaboration of an overview of the most significant harmful agents and measures against them when prioritizing biological methods in the protection of the specified type of cultivated plant.

Learning outcomes:
Providing basic information about agents damaging plants and information on plant protection. To a greater extent, paying attention to biological and other more acceptable methods of regulating unwanted organisms in various areas of plant cultivation. Learning practical procedures and principles in applying these gentler methods on model examples. This should make it possible to apply and develop this knowledge in other areas of the management of natural and close to nature systems, where the regulation of undesirable and, conversely, the support of desired types of organisms is expected.

Brief outline of the course:
1. Integrated plant protection (IOR), basic concepts, history of plant protection.
2. Symptoms of plant damage, harmful agents - basic division.
3. Selected viral, bacterial and fungal plant diseases.
4. Selected phytophagous animals.
5. Procedures in plant protection - basic division.
6. Chemical plant protection.
7. Biological protection of plants.
8. Integrated protection of plants in greenhouses.
9. Integrated plant protection in agriculture (external areas).

10. Integrated plant protection in forestry.
11. Invasive species of plants and animals and the possibilities of solving problems associated with them based on the principles of integrated plant protection.
12. Models, perspectives of integrated plant protection.

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 74

A	B	C	D	E	FX
5.41	24.32	20.27	20.27	29.73	0.0

Provides: Ing. Martin Suvák, PhD.

Date of last modification: 11.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ TR1/99	**Course name:** Plant Taxonomy

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities:

Conditions for course completion:
1. Lectures on the subject are not compulsory, but are highly recommended, exercises are compulsory.
2. Students must master the basic methods of collecting botanical samples in the field for various types of analysis, work with plant material in the karyological and palynological laboratory and in the flow cytometry laboratory, learn the basic principles of molecular taxonomy, be able to understand articles using phenetic and cladistic methods, he orients himself in the basic principles of botanical nomenclature.
3. An oral exam is part of the completion of the subject.

Learning outcomes:
The subject of plant taxonomy is a basic subject for understanding modern systematics of plants and its importance for the study of various taxonomic groups, the student is oriented in the used methods of taxonomic work and their evaluation, is able to create taxonomic hypotheses and design a way of verifying these hypotheses. He is able to use the knowledge in basic botanical research, but also to apply it to solving problems in plant breeding, in agricultural practice, in the evaluation of plant biota in plant protection and biodiversity preservation.

Brief outline of the course:
1. Taxonomy of plants. The importance of classification and the problems associated with it. Information sources and taxonomic data. Morphology and anatomy, embryology, palynology, cytology, karyology, ecology, phytogeography.
2. Determination of taxonomic relationships.
3. Approaches to biological classification. Examples of past and present plant systems. The "Angiosperm Phylogeny Group IV" system.
4. Variability of plants and its study. Early works on plant variability. Multivariate data in taxonomy - phenetic data analysis.
5. The size of the plant genome and approaches to its study. Flow cytometry. Angiosperm genome size evolution.
6. Parallel and convergent evolution. Examples: parasitism, insectivory and C4-metabolism.
7. Basic principles of cladistics.
8. Cladistic studies - revealing the branches of evolution.

9. Principles of molecular systematics of plants.
10. Basics of botanical nomenclature. International code of nomenclature of algae, fungi and plants.
11. Taxonomic publications and examples of taxonomic studies I. Examples from the genus Viola.
12. Taxonomic publications and examples of taxonomic studies II. Examples from the genus Onosma.
Exercises (they take place in blocks):
1. Introduction to plant taxonomy exercises. Herbarium documents and their meaning.
2. Fieldwork in botany, collection of samples, processing of plant material, practical demonstrations.
3.- 4. Palynological methods. Collection and preparation of samples, observation of preparations and their evaluation.
5.- 6. Karyological methods in plant taxonomy. Sampling, preparation of specimens, observation and evaluation of specimens.
7.- 8. Phenetic data analysis – examples and demonstrations of plant material processing, multivariate data analysis, clustering and ordination methods.
9.- 10. Use of flow cytometry in plant taxonomy. Determination of the degree of ploidy and the size of the plant genome. Determination of reproductive method of plants - FCSS (flow cytometric seed screen).
11.-12. Molecular systematics of plants. Parsimony analysis of DNA sequences, phenetic analysis of AFLP DNA fragments - examples and demonstrations.
13. Basics of botanical nomenclature. International code of nomenclature of algae, fungi and plants. Practical tasks.

Recommended literature:

Briggs D., Walters S. M.: Proměnlivost a evoluce rostlin. – CUP, UP Olomouc 2001.
Mártonfi P.: Systematika cievnatých rastlín. 4. vydanie - Vydavateľstvo UPJŠ, Košice, 2013.
Marhold K., Suda J.: Statistické zpracování mnohorozměrných dat v taxonomii (Fenetické metody). – Karolinum, UK Praha 2002.
Turland et al. (Eds.):International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017 Regnum Vegetabile - Koeltz Scientific Books, 2018. https://www.iaptglobal.org/icn
Stuessy T. F.: Plant Taxonomy. - 2n Ed. New York 2009.
Judd W. S., Campbell Ch. S., Kellogg E. A. & Stevens P. F., Donoghue M. J.: Plant Systematics. A Phylogenetic Approach, 4th edition. – Sinauer Associates, Sunderland, 2016.
Simpson M. G.: Plant Systematics. – Elsevier, Amsterdam etc., 3. ed., 2019.

Course language:

Notes:

Course assessment

Total number of assessed students: 142

A	B	C	D	E	FX
36.62	21.83	21.13	10.56	7.04	2.82

Provides: prof. RNDr. Pavol Mártonfi, PhD., Mgr. Vladislav Kolarčik, PhD., univerzitný docent

Date of last modification: 24.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ STFR/20	**Course name:** Plant stress physiology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
1. 100% participation at exercises and their pass
2. demonstration of independence and practical skills when solving tasks in the exercises
3. presentation of results at the end of the semester in the field of biotic and abiotic factors affecting plants
4. proof the knowledge of the subject in the form of an oral exam

Learning outcomes:
After completing the subject, the student should gain knowledge about biotic and abiotic influences on plants, plant reactions to stress and mechanisms of signal transmission, as well as mechanisms of adaptation and acclimatization in stressful conditions. Practical exercises will provide the student with laboratory skills in observing physiological changes and responses to biotic and abiotic factors. The student will become familiar with the basics of using a spectrophotometer, a fluorescence camera and other small laboratory devices used in plant stress physiology.

Brief outline of the course:
1. Functions of plants in different types of environment
2. Characteristics of stress and common mechanisms of stress reactions
3. Abiotic stress factors and their effect on plants - UV radiation
4. Abiotic stress factors and their effect on plants - the effect of high and low temperatures
5. Abiotic stress factors and their effect on plants - the effect of lack of water on plants
6. Abiotic stress factors and their effect on plants - effect of lack of mineral nutrients
7. Abiotic stress factors and their effect on plants - lack of oxygen in the soil
8. Abiotic stress factors and their effect on plants - highly saline and acidic soils
9. Abiotic stress factors and their effect on plants - toxic substances in the soil and in the air
10. Biotic stress factors and their effect on plants - competition, allelopathy, mycorrhiza
11. Biotic stress factors and their effect on plants - plant reactions to pathogenic organisms and protection from herbivores
12. Presentation of the results on the selected topic of the impact of stress I. (presentation of student results)
13. Presentation of the results on the selected topic of the impact of stress II. (presenting student results)

Recommended literature:

Lectures
articles from the Web of Science and Scopus databases
Slováková, Ľ., Mistrík I. 2007: Physiological processes of plants under conditions of stress, Bratislava
Hirt H., 2009: Plant stress biology, Wiley-Blackwell
Pessarakli M. ed., 2011: Handbook of Plant and Crop Stress, Third edition, CRC Press
Taiz L, Zeiger E, ed. 2018 Plant physiology and development, 6th edition, Oxford

Course language:

slovak, english

Notes:

Course assessment

Total number of assessed students: 16

A	B	C	D	E	FX
81.25	18.75	0.0	0.0	0.0	0.0

Provides: doc. RNDr. Michal Goga, PhD., RNDr. Dajana Kecsey, PhD.

Date of last modification: 31.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/EP/14	**Course name:** Population Ecology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 1 / 1 **Per study period:** 14 / 14
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
Oral examination
Running evaluation: active (100%) participation in seminars and lectures
preparation of the presentation to the given topic

Learning outcomes:

Brief outline of the course:
Population ecology includes study of the structure and dynamics of populations (chose population characteristics such as density/abundance, distribution/population dispersion patterns, natality, mortality) interactions between populations of organisms and environmental factors based on mathematical models, theories, and population methods applied in various ecosystems. Population ecology elucidates growth models and changes in populations.

Recommended literature:
Rockwood Larry L., 2006: Introduction to population ecology, 339 pp., Malden, Mass.: Blackwell

Course language:

Notes:

Course assessment
Total number of assessed students: 41

A	B	C	D	E	FX
63.41	7.32	24.39	4.88	0.0	0.0

Provides: RNDr. Natália Raschmanová, PhD., univerzitná docentka

Date of last modification: 11.07.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ CM/13	**Course name:** Seaside Aerobic Exercise

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:
Completion: passed
Condition for successful course completion:
- active participation in line with the study rule of procedure and course guidelines
- effective performance of all tasks- aerobics, water exercise, yoga, Pilates and others

Learning outcomes:
Content standard:
The student demonstrates relevant knowledge and skills in the field, which content is defined in the course syllabus and recommended literature.
Performance standard:
Upon completion of the course students are able to meet the performance standard and:
- perform basic aerobics steps and basics of health exercises,
- conduct verbal and non-verbal communication with clients during exercise,
- organise and manage the process of physical recreation in leisure time

Brief outline of the course:
Brief outline of the course:
1. Basic aerobics – low impact aerobics, high impact aerobics, basic steps and cuing
2. Basics of aqua fitness
3. Basics of Pilates
4. Health exercises
5. Bodyweight exercises
6. Swimming
7. Relaxing yoga exercises
8. Power yoga
9. Yoga relaxation
10. Final assessment

Students can engage in different sport activities offered by the sea resort – swimming, rafting, volleyball, football, table tennis, tennis and other water sports in particular.

Recommended literature:
1. BUZKOVÁ, K. 2006. Fitness jóga. Praha: Grada. 167 s.

2. ČECHOVSKÁ, I., MILEROVÁ, H., NOVOTNÁ, V. Aqua-fitness. Praha: Grada. 136 s.
3. EVANS, M ., HUDSON, J., TUCKER, P. 2001. Umění harmonie: meditace, jóga, tai-či, strečink. 192 s.
4. JARKOVSKÁ, H., JARKOVSKÁ, M. 2005. Posilováni s vlastním tělem 417 krát jinak. Praha: Grada. 209 s.
5. KOVAŘÍKOVÁ, K. 2017. Aerobik a fitness. Karolium, 130 s.

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 62

abs	n
9.68	90.32

Provides: Mgr. Agata Dorota Horbacz, PhD.

Date of last modification: 29.03.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KF/ FIVYC/22	**Course name:** Selected Topics in Philosophy of Education (General Introduction)

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 1 / 1 **Per study period:** 14 / 14
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 2

A	B	C	D	E	FX
100.0	0.0	0.0	0.0	0.0	0.0

Provides: PhDr. Dušan Hruška, PhD.

Date of last modification: 27.04.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/SDPa/22	**Course name:** Seminar to diploma thesis

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 4 **Per study period:** 56
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities:

Conditions for course completion:
Successful encompassment of theoretical background and experimental work within the context of the diploma thesis.

Learning outcomes:
To contribute to the current state of the art within the field of the diploma thesis and to be capable of interpretation of the results in a wider context of the knowledge.

Brief outline of the course:

Recommended literature:
Recommended papers from the studied field.

Course language:

Notes:

Course assessment
Total number of assessed students: 291

abs	n
100.0	0.0

Provides:

Date of last modification: 19.02.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/SDPb/22	**Course name:** Seminar to diploma thesis

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 4 **Per study period:** 56
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
Successful encompassment of theoretical background and experimental work within the context of the diploma thesis.

Learning outcomes:
To contribute to the current state of the art within the field of the diploma thesis and to be capable of interpretation of the results in a wider context of the knowledge.

Brief outline of the course:

Recommended literature:
Recommended papers from the studied field.

Course language:

Notes:

Course assessment
Total number of assessed students: 234

abs	n
100.0	0.0

Provides:

Date of last modification: 19.02.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ SDPc/22	**Course name:** Seminar to diploma thesis
Course type, scope and the method: **Course type:** Practice **Recommended course-load (hours):** **Per week:** 4 **Per study period:** 56 **Course method:** present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course: 3.	
Course level: II.	
Prerequisities:	
Conditions for course completion: Successful encompassment of theoretical background and experimental work within the context of the diploma thesis.	
Learning outcomes:	
Brief outline of the course:	
Recommended literature: Recommended papers from the studied field.	
Course language:	
Notes:	
Course assessment Total number of assessed students: 253	

abs	n
100.0	0.0

Provides:
Date of last modification: 19.02.2022
Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ SDPd/22	**Course name:** Seminar to diploma thesis

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 4 **Per study period:** 56
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course: 4.

Course level: II.

Prerequisities:

Conditions for course completion:
Successful encompassment of theoretical background and experimental work within the context of the diploma thesis.

Learning outcomes:
To contribute to the current state of the art within the field of the diploma thesis and to be capable of interpretation of the results in a wider context of the knowledge.

Brief outline of the course:

Recommended literature:
Recommended papers from the studied field.

Course language:

Notes:

Course assessment
Total number of assessed students: 42

A	B	C	D	E	FX
83.33	4.76	9.52	2.38	0.0	0.0

Provides:

Date of last modification: 19.02.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ TVa/11	**Course name:** Sports Activities I.

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 1.

Course level: I., II.

Prerequisities:

Conditions for course completion:
Min. 80% of active participation in classes.

Learning outcomes:
Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
Brief outline of the course:
The Institute of physical education and sport at the Pavol Jozef Šafárik University offers 20 sports activities aerobics; aikido, basketball, badminton, body-balance, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, fitness, indoor football, SM system, step aerobics, table tennis, chess, volleyball, tabata, cycling.
Additionally, the Institute of physical education and sport at the Pavol Jozef Šafárik University offers winter courses (ski course, survival) and summer courses (aerobics by the sea, rafting on the Tisza River) with an attractive programme, sports competitions with national and international participation.

Recommended literature:
BENCE, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571
BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252.
JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308.
KAČÁNI, L. 2002. Futbal:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027.
KRESTA, J. 2009. Futsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.
LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.

STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 15781

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
85.74	0.06	0.0	0.0	0.0	0.04	9.0	5.15

Provides: Mgr. Patrik Berta, Mgr. Agata Dorota Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Ladislav Kručanica, PhD., Mgr. Richard Melichar, Mgr. Petra Tomková, PhD., Mgr. Marcel Čurgali, Mgr. Alena Buková, PhD., univerzitná docentka, doc. PaedDr. Ivan Uher, MPH, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Zuzana Küchelová, PhD., Mgr. Ferdinand Salonna, PhD.

Date of last modification: 07.02.2024

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ TVb/11	**Course name:** Sports Activities II.

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 2.

Course level: I., II.

Prerequisities:

Conditions for course completion:
active participation in classes - min. 80%.

Learning outcomes:
Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
Brief outline of the course:
The Institute of physical education and sport at the Pavol Jozef Šafárik University offers 20 sports activities aerobics; aikido, basketball, badminton, body-balance, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, fitness, indoor football, SM system, step aerobics, table tennis, chess, volleyball, tabata, cycling.
Additionally, the Institute of physical education and sport at the Pavol Jozef Šafárik University offers winter courses (ski course, survival) and summer courses (aerobics by the sea, rafting on the Tisza River) with an attractive programme, sports competitions with national and international participation.

Recommended literature:
BENCE, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571
BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252.
JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308.
KAČÁNI, L. 2002. Futbal:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027.
KRESTA, J. 2009. Futsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.
LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.

STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 13799

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
83.85	0.49	0.01	0.0	0.0	0.04	11.17	4.43

Provides: Mgr. Agata Dorota Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Marcel Čurgali, Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Mgr. Richard Melichar, Mgr. Petra Tomková, PhD., Mgr. Alena Buková, PhD., univerzitná docentka, doc. PaedDr. Ivan Uher, MPH, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Zuzana Küchelová, PhD., Mgr. Ferdinand Salonna, PhD.

Date of last modification: 07.02.2024

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ TVc/11	**Course name:** Sports Activities III.

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 3.

Course level: I., II.

Prerequisities:

Conditions for course completion:
min. 80% of active participation in classes

Learning outcomes:
Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
Brief outline of the course:
The Institute of physical education and sport at the Pavol Jozef Šafárik University offers 20 sports activities aerobics; aikido, basketball, badminton, body-balance, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, fitness, indoor football, SM system, step aerobics, table tennis, chess, volleyball, tabata, cycling.
Additionally, the Institute of physical education and sport at the Pavol Jozef Šafárik University offers winter courses (ski course, survival) and summer courses (aerobics by the sea, rafting on the Tisza River) with an attractive programme, sports competitions with national and international participation.

Recommended literature:
BENCE, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571
BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252.
JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308.
KAČÁNI, L. 2002. Futbal:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027.
KRESTA, J. 2009. Futsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.
LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.

STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 9334

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
87.96	0.06	0.01	0.0	0.0	0.02	4.92	7.03

Provides: Mgr. Marcel Čurgali, Mgr. Agata Dorota Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Mgr. Richard Melichar, Mgr. Petra Tomková, PhD., Mgr. Alena Buková, PhD., univerzitná docentka, doc. PaedDr. Ivan Uher, MPH, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Zuzana Küchelová, PhD., Mgr. Ferdinand Salonna, PhD.

Date of last modification: 07.02.2024

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ TVd/11	**Course name:** Sports Activities IV.

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 4.

Course level: I., II.

Prerequisities:

Conditions for course completion:
min. 80% of active participation in classes

Learning outcomes:
Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.

Brief outline of the course:
Brief outline of the course:
The Institute of physical education and sport at the Pavol Jozef Šafárik University offers 20 sports activities aerobics; aikido, basketball, badminton, body-balance, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, fitness, indoor football, SM system, step aerobics, table tennis, chess, volleyball, tabata, cycling.
Additionally, the Institute of physical education and sport at the Pavol Jozef Šafárik University offers winter courses (ski course, survival) and summer courses (aerobics by the sea, rafting on the Tisza River) with an attractive programme, sports competitions with national and international participation.

Recommended literature:
BENCE, M. et al. 2005. Plávanie. Banská Bystrica: FHV UMB. 198s. ISBN 80-8083-140-8. [online] Dostupné na: https://www.ff.umb.sk/app/cmsFile.php?disposition=a&ID=571
BUZKOVÁ, K. 2006. Fitness jóga, harmonické cvičení těla I duše. Praha: Grada. ISBN 8024715252.
JARKOVSKÁ, H, JARKOVSKÁ, M. 2005. Posilování s vlastním tělem 417 krát jinak. Praha: Grada. ISBN 9788024757308.
KAČÁNI, L. 2002. Futbal:Tréning hrou. Bratislava: Peter Mačura – PEEM. 278s. ISBN 8089197027.
KRESTA, J. 2009. Futsal.Praha: Grada Publishing, a.s. 112s. ISBN 9788024725345.
LAWRENCE, G. 2019. Power jóga nejen pro sportovce. Brno: CPress. ISBN 9788026427902.
SNER, Wolfgang. 2004. Posilování ve fitness. České Budějovice: Kopp. ISBN 8072322141.

STACKEOVÁ, D. 2014. Fitness programy z pohledu kinantropologie. Praha: Galén. ISBN 9788074921155.
VOMÁČKO, S. BOŠTÍKOVÁ, S. 2003. Lezení na umělých stěnách. Praha: Grada. 129s. ISBN 8024721743.

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 5845

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
82.53	0.27	0.03	0.0	0.0	0.0	8.25	8.91

Provides: Mgr. Marcel Čurgali, Mgr. Agata Dorota Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Mgr. Richard Melichar, Mgr. Petra Tomková, PhD., Mgr. Alena Buková, PhD., univerzitná docentka, doc. PaedDr. Ivan Uher, MPH, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Zuzana Küchelová, PhD., Mgr. Ferdinand Salonna, PhD.

Date of last modification: 07.02.2024

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ SVK/01	**Course name:** Student Scientific Conference
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course:	
Course level: I., II.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 31

abs	n
100.0	0.0

Provides:
Date of last modification: 30.11.2021
Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ LKSp/13	**Course name:** Summer Course-Rafting of TISA River

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: 2 **Per study period:** 28
Course method: present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:
Completion: passed
Condition for successful course completion:
- active participation in line with the study rule of procedure and course guidelines
- effective performance of all tasks: carrying a canoe, entering and exiting a canoe, righting a canoe, paddling

Learning outcomes:
Content standard:
The student demonstrates relevant knowledge and skills in the field, which content is defined in the course syllabus and recommended literature.
Performance standard:
Upon completion of the course students are able to meet the performance standard and:
- implement the acquired knowledge in different situations and practice,
- implement basic skills to manipulate a canoe on a waterway,
- determine the right spot for camping,
- prepare a suitable material and equipment for camping.

Brief outline of the course:
Brief outline of the course:
1. Assessment of difficulty of waterways
2. Safety rules for rafting
3. Setting up a crew
4. Practical skills training using an empty canoe
5. Canoe lifting and carrying
6. Putting the canoe in the water without a shore contact
7. Getting in the canoe
8. Exiting the canoe
9. Taking the canoe out of the water
10. Steering
a) The pry stroke (on fast waterways)
b) The draw stroke

11. Capsizing
12. Commands

Recommended literature:
1. JUNGER, J. et al. Turistika a športy v prírode. Prešov: FHPV PU v Prešove. 2002. ISBN 8080680973.
Internetové zdroje:
1. STEJSKAL, T. Vodná turistika. Prešov: PU v Prešove. 1999.
Dostupné na: https://ulozto.sk/tamhle/UkyxQ2lYF8qh/name/Nahrane-7-5-2021-v-14-46-39#!ZGDjBGR2AQtkAzVkAzLkLJWuLwWxZ2ukBRLjnGqSomICMmOyZN==

Course language:
Slovak language

Notes:

Course assessment
Total number of assessed students: 232

abs	n
36.64	63.36

Provides: Mgr. Dávid Kaško, PhD.

Date of last modification: 29.03.2022

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ ZOG1/03	**Course name:** Zoogeography

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 2 **Per study period:** 28 / 28
Course method: present

Number of ECTS credits: 6

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:
Active participation in seminars.
Preparation of oral presentation to a selected topic.
Completion of two semestral written examinations.
Oral examination.

Learning outcomes:
The main goal of the subject is to get knowledge on the basic reasons of recent distribution of the animals on the Earth, zoogeographic regionalization of the Earth´s surface and human influence on the faunal distribution in the history.

Brief outline of the course:
This course will review our current understanding of the patterns of animal distribution and the processes that influence distributions of species and their attributes. Zoogeography will integrate information on the historical and current ecology, genetics, and physiology of animals and their interaction with environmental processes (continental drift, climate) in regulating geographic distributions. The course will emphasize descriptive and analytical approaches useful in hypothesis testing in zoogeography and will illustrate applied aspects of zoogeography (e.g. refuge design in conservation).

Recommended literature:
Buchar, J., 1983: Zoogeografie. SPN Praha
Darlington, P.J., 1998: Zoogeography: The geographical distribution of animals. Krieger, USA
Lomolino M.V., Brown J.H., Riddle B. R., 2005: Biogeography. Sinauer Associates, 1-845
Plesník, P., Zatkalík, F., 1996: Biogeografia. Vysokoškolské skriptá, PríFUK Bratislava

Course language:

Notes:

Course assessment
Total number of assessed students: 1033

A	B	C	D	E	FX
25.56	23.14	23.43	18.49	7.74	1.65

Provides: prof. RNDr. Ľubomír Kováč, CSc., RNDr. Natália Raschmanová, PhD., univerzitná docentka

Date of last modification: 10.12.2021

Approved: prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat.