CONTENT

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ PMB/22	**Course name:** Advanced microscopic methods in biology
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: III.	
Prerequisities:	
Conditions for course completion: Active presence at the exercises.	
Learning outcomes: Students will be able to design and realize experiment using imaging methods in the field of biomedical research.	
Brief outline of the course: 1. design of biological experiment, legislative and ethic aspects of biological experiments 2. formulation of scientific hypothesis and strategy of suitable experimental method to reach the aims of experiment 3. selection of appropriate experimental animal to reach the aims of experiment 4. selection of appropriate method for isolation and processing of biological material (tissue isolation, fixation, freezing, processing and sectioning of biological sample) 5. immunolabelling of cells and tissues for light, fluorescent and electron microscopy 6. design and preparation of probes for in situ hybridization 7. methods for visualization of cells and tissues using epifluorescent microscopy 8. methods of visualization of cells and tissues using transmission electron microscopy 9. methods of visualization of cells and tissues using scanning electron microscopy 10. application of transgenic animals in experimental research 11. processing of images using software ImageJ, generation of image output 12. quantification and statistical analysis	
Recommended literature:	
Course language:	
Notes: If necessary, subject may be realized in distant form of study.	

Course assessment Total number of assessed students: 6	
N	P
0.0	100.0
Provides: RNDr. Anna Alexovič Matiašová, PhD., RNDr. Ján Košuth, 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: ÚCHV/ BINF/06	**Course name:** Bioinformatics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 4 / 2 **Per study period:** 56 / 28
Course method: present

Number of ECTS credits: 10

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Independent work on assignments during the semester
Final assignment, exam

Learning outcomes:
The student will obtain information and practical experience with methods of obtaining and analyzing biological sequences using either a PC and freely available software (BioEdit, RasMol, VNTI-Viewer, MAGA), as well as using software available via the www network.
In addition to basic information, students will also get information about some specialized analyzes - molecular taxonomy, phylogenetic analysis and prediction of biopolymer structures.

Brief outline of the course:
Use of PC and online web servers in sequence analysis. Freely available biological databases (PubMed, GenBank, SwissProt). Analysis of nucleotide sequences. Analysis of protein sequences. Pairwise sequence comparisons - blast analysis. Multiple sequence comparison - clustal program. Molecular taxonomy of bacteria. Evolutionary and phylogenetic analyses. Predicting the secondary and tertiary structure of biopolymers.

Recommended literature:
The phylogenetic handbook, Salemi, M. a Vandamme, A-M., Cambridge University Press, 2003, 485 pp
Bioinformatics: a practical guide to the analysis of genes and proteins, Baxevanis, AD; Francis Ouellette, BF. 4th edition, Wiley, 2020, 609 pp.

Course language:
slovak, english

Notes:

Course assessment
Total number of assessed students: 47

N	P
0.0	100.0

Provides: doc. RNDr. Peter Pristaš, CSc., univerzitný profesor
Date of last modification: 09.08.2022
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/ BRS1/22	**Course name:** Biology of Plant Symbioses

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: III.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 4

N	P
0.0	100.0

Provides: doc. RNDr. Michal Goga, PhD.

Date of last modification: 25.11.2021

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/ BM1/22	**Course name:** Bryology

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: III.

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 skills in the field of bryophyte separation acquired at lectures and seminars (systematics of bryophytes, distribution, ecological and physiological properties of bryophytes)
3. Demonstration of sufficient skills in the use of methodologies that are part of the subject's laboratory exercises
4. Passing an oral exam, where the graduate demonstrates sufficient knowledge in the applied biology of bryophytes

Learning outcomes:
The student will learn the basics of the second largest group of terrestrial plants, called bryophytes. The subject of the study will be the systematics, distribution, ecological and physiological properties and peculiarities of the group. In addition, the student will gain knowledge about the applied biology of bryophytes, emphasis will be placed on eco-engineering, environmental use and biotechnology. The aim of the subject is for students to have an idea of the fundamental importance as well as the importance of this neglected group of plants.

Brief outline of the course:
1. Systematics of bryophytes
2. Nomenclature and phylogenetics
3. Chemistry of bryophytes (liverworts, hornworts)
4. Chemistry of bryophytes (mosses)
5. Functional characteristics of bryophytes (liverworts, hornworts)
6. Functional features of bryophytes (mosses)
7. Functional features of bryophytes (relationships to other organisms)
8. Ecology of bryophytes (idioecology)

9. Ecology of bryophytes (cenology)
10. Environment-related bryophytes (natural environment)
11. Environment-related bryophytes (artificial environment)
12. Biotechnologies of bryophytes (liverworts, hornworts)
13. Biotechnologies of bryophytes (mosses)

Recommended literature:

Goffinet B, Shaw A J (2008) Bryophyte Biology (2nd ed.). Cambridge University Press p. 580, ISBN 9780521693226
Vanderpoorten A, Goffinet B. (2009) Introduction to bryophytes. Cambridge University Press p. 328 ISBN 9780521700733

Course language:
slovak, english

Notes:

Course assessment
Total number of assessed students: 5

N	P
0.0	100.0

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

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/ COK/22	**Course name:** Certified training course

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

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Completion of a certified professional/training course.

Learning outcomes:
The PhD student acquires up-to-date scientific knowledge, develops the capabilities of scientific work and familiarizes himself with the methodologies of making scientific knowledge available. He confronts his own knowledge and skills with other course participants, develops the abilities of peer discussion in the given scientific field.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 15

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/CM/22	**Course name:** Citation in monograph

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

Number of ECTS credits: 8

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Obtained citation registered in SCI or Scopus.

Learning outcomes:
Obtaining a citation demonstrates broad and very well-founded scientific knowledge in the researched field, based on the ability to formulate research questions, to reflect on a scientific problem in such a way that generates new knowledge. At the same time, a citation in an indexed source demonstrates the competence to communicate new knowledge, which is a significant contribution to scientific knowledge, at the highest expert level.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 1

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ CZC/22	**Course name:** Citation in scientific journal published abroad

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

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Obtained citation in a foreign scientific journal.

Learning outcomes:
Obtaining a citation demonstrates broad and very well-founded scientific knowledge in the researched field, based on the ability to formulate research questions, to reflect on a scientific problem in such a way that generates new knowledge. At the same time, a citation in an indexed source demonstrates the competence to communicate new knowledge, which is a significant contribution to scientific knowledge, at the highest expert level.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 16

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ CDC/22	**Course name:** Citation in scientific journal published in the country of residence
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** distance, present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion: Citation in a national scientific journal	
Learning outcomes: Obtaining a citation demonstrates broad and very well-founded scientific knowledge in the researched field, based on the ability to formulate research questions, to reflect on a scientific problem in such a way that generates new knowledge. At the same time, a citation in an indexed source demonstrates the competence to communicate new knowledge, which is a significant contribution to scientific knowledge, at the highest expert level.	
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:
Date of last modification: 08.11.2022
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/ SCI/22	**Course name:** Citation registered in Science Citation Index

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

Number of ECTS credits: 8

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Obtained citation registered in SCI or Scopus.

Learning outcomes:
Obtaining a citation demonstrates broad and very well-founded scientific knowledge in the researched field, based on the ability to formulate research questions, to reflect on a scientific problem in such a way that generates new knowledge. At the same time, a citation in an indexed source demonstrates the competence to communicate new knowledge, which is a significant contribution to scientific knowledge, at the highest expert level.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 40

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/SPAV/22	**Course name:** Co-investigator of the applied research project

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Co-investigator of the applied research project

Learning outcomes:
The PhD student demonstrates the ability to participate in teamwork, to bring his own contribution to the solution of the project objective of applied research and to take responsibility for assigned tasks. By solving an applied research project, he acquires the ability to implement the project objective according to the established procedure, to follow the project schedule, to coordinate his own activities with colleagues, to participate in the creation of applied research outputs. The PhD student gains valuable experience from the practical course of a grant project with a focus on applied research.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 2

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ SMP/22	**Course name:** Co-worker of project supported by international grant schemes

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

Number of ECTS credits: 15

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Membership in the research team of an international project.

Learning outcomes:
Active involvement by solving a specific task within a team of international project solvers. The PhD student demonstrates the ability to work in a team, take responsibility for the assigned task, adhere to the time schedule and fulfill the project outputs. The PhD student gains personal experience from the implementation of an international project, participation in its key stages, creation of measurable outputs, grant funding of science.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 11

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ SDP/22	**Course name:** Co-worker of project supported by national grant schemes

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

Number of ECTS credits: 10

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Co-investigator of the domestic project

Learning outcomes:
The PhD student demonstrates the ability to participate in teamwork, to bring his own contribution to the solution of the project objective and to take responsibility for the assigned tasks. By solving the domestic project, he acquires the ability to implement the project intention according to the established procedure, to follow the project schedule, to coordinate his own activities with colleagues, to participate in the creation of outputs. The PhD student gains valuable experience from the practical course of the grant project.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 107

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/DK/04	**Course name:** Conference in the country of residence

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

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Active participation in the home conference.

Learning outcomes:
By actively participating in the national scientific conference, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology in his scientific field. He demonstrates the ability to reflect on a specific scientific problem by using the latest approaches and applying them critically. Demonstrates competence in using existing theories and concepts in an innovative way, as well as generating new original scientific knowledge and communicating research results to a wider audience using adequate means and through the Slovak language.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 183

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ PDS/22	**Course name:** Elaboration and defence of the thesis, successful completion of the dissertation examination
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** distance, present	
Number of ECTS credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion: Obtaining the required number of credits in the prescribed composition according to the UPJŠ study regulations, preparation and defense of the thesis, successfully completed dissertation examination.	
Learning outcomes: The PhD student demonstrated the prerequisites for successful continuation of the study by fulfilling the conditions prescribed by the study regulations for the study and scientific part of the doctoral study related to the topic of the dissertation.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 26	

N	P
0.0	100.0

Provides:
Date of last modification: 08.11.2022
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/ODZP/22	**Course name:** Elaboration and defense of the work, successfully completed dissertation exam

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

Number of ECTS credits: 30

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
The Dissertation thesis is the result of the student's own scientific research. It must not show elements of academic fraud and must meet the criteria of correct research practice defined in the Rector's Decision no. 21/2021, which lays down the rules for assessing plagiarism at Pavel Jozef Šafárik University in Košice and its constituents. Fulfillment of the criteria is verified mainly in the process of supervising and in the process of the thesis defense. Failure to do so is grounds for disciplinary action.

Learning outcomes:
The Dissertation thesis has elements of a scientific work and the student demonstrates extensive mastery of the theory and professional terminology of the field of study, acquisition of knowledge, skills and competences in accordance with the declared profile of the graduate of the field of study, as well as the ability to apply them in an original way in solving selected problems of the field of study. The student demonstrates the ability of independent scientific work in terms of content, formal and ethical aspects. Further details of the Dissertation thesis are determined by Directive no. 1/2011 on the essential prerequisites of final theses and by the Study Rules of Procedure at UPJŠ in Košice for doctoral studies.
The doctoral student demonstrated the ability and readiness for independent scientific and creative activity in the field of study of philology in accordance with the expectations of the relevant qualification framework and the profile of the graduate.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 21

N	P
0.0	100.0

Provides:
Date of last modification: 08.11.2022
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/ VPZP/22	**Course name:** Elaboration of reviewer report
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion: Elaboration of reviewer report	
Learning outcomes: The PhD student demonstrates broad and scientifically based knowledge in the field of study, as well as knowledge of a wide range of methods and approaches. Demonstrates the ability to critically assess a professional problem and its proposed solution, as well as to evaluate it and possibly recommend another solution. He applies knowledge and skills from the field of pedagogical sciences to his own field.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 4	

abs	n
100.0	0.0

Provides:
Date of last modification: 08.11.2022
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: CJP/ AJD1/07	**Course name:** English Language for PhD Students 1

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

Number of ECTS credits: 2

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:
Completion of e-course English for PhD Students (lms.upjs.sk), consultations (1-3).
Written assignments - Professional/Academic CV, Short Academic Biography.

Learning outcomes:
The development of students´ language skills - reading, writing, listening, speaking; improvement of their linguistic competence - students acquire knowledge of selected phonological, lexical and syntactic aspects; development of pragmatic competence - students acquire skills for effective and purposeful communication, with focus on Academic English and English for specific/professional purposes, level B2.

Brief outline of the course:
Specific aspects of academic and professional English with focus on correct pronunciation, vocabulary development (noun and verb collocations, phrasal verbs, prepositional phrases, word-formation, formal/informal language, etc.), selected aspects of English grammar (prepositions, grammar tenses, passive voice, etc.), academic writing (professional/academic CV, Short Academic Biography).

Recommended literature:
Moore, J.: Oxford Academic Vocabulary Practice. OUP, 2017.
Kolaříková, Z., Petruňová, H., Timková, R.: Angličtina v akademickom prostredí – cvičebnica. Košice, Vydavateľstvo ŠafárikPress, 2021.
Tomaščíková, S., Rozenfeld, J. Developing Academic English in Speaking and Writing. Vydavateľstvo ŠafárikPress, 2021.
McCarthy, M., O´Dell, F.: Academic Vocabulary in Use. CUP, 2008.
Štepánek, L., J. De Haff a kol.: Academic English-Akademická angličtina. Grada Publishing, a.s., 2011.
Armer, T.: Cambridge English for Scientists. CUP, 2011.
lms.upjs.sk

Course language:
English, level B2 according to CEFR

Notes:

Course assessment
Total number of assessed students: 853

N	Ne	P	Pr	abs	neabs
0.0	0.0	41.85	0.0	58.03	0.12

Provides: Mgr. Zuzana Kolaříková, PhD., Mgr. Ivana Kupková, PhD.

Date of last modification: 04.02.2026

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: CJP/ AJD2/07	**Course name:** English Language for PhD Students 2
Course type, scope and the method: **Course type:** Practice **Recommended course-load (hours):** **Per week:** 2 **Per study period:** 28 **Course method:** distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisities:	
Conditions for course completion: Test, oral exam in accordance with the exam requirements (available at the web-site of the LTC and in MS TEAMS)	
Learning outcomes: The development of students´ language skills - reading, writing, listening, speaking, improvement of their linguistic competence - students acquire knowledge of selected phonological, lexical and syntactic aspects, development of pragmatic competence - students can efectively use the language for a given purpose, with focus on Academic English and English for specific/professional purposes, level B2.	
Brief outline of the course: Academic communication (self-presentation, presenting at scientific meetings and conferences). Specific aspects of academic and professional English with focus on vocabulary development (formality, academic word-list), English grammar (passive voice, nominalisatio), language functions (expressing opinion, cause/effect, presenting arguments, giving examples, describing graphs/charts/schemes, etc.). Cross-language interference.	
Recommended literature: Moore, J.: Oxford Academic Vocabulary Practice. OUP, 2017. Kolaříková, Z., Petruňová, H., Timková, R.: Angličtina v akademickom prostredí (cvičebnica). UPJŠ Košice, 2021. Tomaščíková, S., Rozenfeld, J. Developing Academic English in Speaking and Writing. Vydavateľstvo ŠafárikPress, 2021. McCarthy, M., O´Dell, F.: Academic Vocabulary in Use. CUP, 2008. Štepánek, L., J. De Haff a kol.: Academic English-Akademická angličtina. Grada Publishing, a.s., 2011. Armer, T.: Cambridge English for Scientists. CUP, 2011.	
Course language: B2 level according to CEFR	
Notes:	

Course assessment
Total number of assessed students: 813

N	Ne	P	Pr	abs	neabs
0.25	0.0	94.34	0.98	4.31	0.12

Provides: Mgr. Zuzana Kolaříková, PhD.

Date of last modification: 09.02.2026

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/ NEM/04	**Course name:** Implementation of new experimental methodology
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** distance, present	
Number of ECTS credits: 15	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment

Total number of assessed students: 124

abs	n
100.0	0.0

Provides:
Date of last modification:
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/ZC/22	**Course name:** Internacional Journal

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

Number of ECTS credits: 8

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Publication accepted in a foreign journal as an author/co-author.

Learning outcomes:
By publishing in a foreign journal as an author/co-author, the PhD student demonstrates a high level of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 5

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ MKZ/22	**Course name:** International Conference

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

Number of ECTS credits: 10

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Active participation in an international conference abroad.

Learning outcomes:
By actively participating in an international scientific conference abroad, the phD student demonstrates a high level of ability to identify, evaluate, and apply correct scientific methods or research methodology in his scientific field. He demonstrates the ability to reflect on a specific scientific problem by using the latest approaches and applying them critically. Demonstrates competence to use existing theories and concepts in an innovative way, as well as generate new original scientific knowledge and communicate research results to a wider audience by adequate means and through a foreign language.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 38

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ ZSP1/22	**Course name:** International Study Stay less than 30 Days

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Completion of a foreign study stay lasting less than 30 days.

Learning outcomes:
By completing a shorter study stay, the PhD student demonstrates the ability to reflect on research problems and work critically with sources at an expert level and in an interdisciplinary context, while being able to generate new knowledge. He is able to actively communicate at an expert level in more than one language. He acts as a responsible independent scientist, works independently and in a group with the aim of pushing the boundaries of knowledge and transferring them to other areas of research, to practice and to the wider public. He can competently argue and explain his ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 17

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ ZSP2/22	**Course name:** International Study Stay more than 30 Days

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

Number of ECTS credits: 10

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Completion of a foreign study stay lasting more than 30 days.

Learning outcomes:
By completing the study stay, the PhD student demonstrates the ability to reflect on research problems and work critically with sources at an expert level and in an interdisciplinary context, while being able to generate new knowledge. He is able to actively communicate at an expert level in more than one language. He acts as a responsible independent scientist, works independently and in a group with the aim of pushing the boundaries of knowledge and transferring them to other areas of research, to practice and to the wider public. He can competently argue and explain his ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 12

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/DKZU/22	**Course name:** International conference taking place in the country of residence

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Active participation in a national conference with foreign participation.

Learning outcomes:
By actively participating in a scientific conference, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology in his scientific field. He demonstrates the ability to reflect on a specific scientific problem by using the latest approaches and applying them critically. Demonstrates competence to use existing theories and concepts in an innovative way, as well as generate new original scientific knowledge and communicate research results to a wider audience by adequate means and through Slovak or a foreign language.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 25

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/SIG/22	**Course name:** Member of the internal project team

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

Number of ECTS credits: 3

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Co-worker of project supported by internal grant schemes (VVGS)

Learning outcomes:
The PhD student demonstrates the ability to participate in teamwork, to bring his own contribution to the solution of the project objective within the internal grant system at UPJŠ. By solving the internal VVGS grant, he acquires the ability to implement the project plan according to the established procedure, adhere to the project schedule, coordinate his own activities with colleagues, and participate in the creation of outputs. The PhD student gains valuable experience from the practical course of the grant project.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 25

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/POVK/22	**Course name:** Membership in conference organising commiittee

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

Number of ECTS credits: 3

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Work in the organizing committee of the conference

Learning outcomes:
By working in the organizing committee of the conference, the PhD student demonstrates the abilities and competences to organize a scientific or professional event independently or in a team, to manage the implementation in terms of time and content, to communicate effectively verbally and in writing using various technical means as needed, including in a foreign language at a professional level with various types of people, if necessary, correctly recommend solutions or make independent decisions.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 5

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/MOBM/09	**Course name:** Methods in Molecular Biology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 1 / 3 **Per study period:** 14 / 42
Course method: present

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:

Learning outcomes:
Acquaint the students with modern methods in molecular biology and with their applications in research and to give them practical basics needed for practical work in molecular biology laboratory.

Brief outline of the course:
Basics of laboratory practice for work under sterile/aseptic conditions in cell culture lab, cell culturing of tumour cell lines, methods for isolation of nucleic acids from cells, determination of protein concentration in cell lysates, measurements of enzymatic concentrations. Polymerase chain reaction, Western blot, dot-blot, fluorescent microscopy, flowcytometric analyses of cellular processes (cell cycle, cell death, mitochondrial parameters, proteomic applications).

Recommended literature:
J. Reinders a A.Sickmann: Proteomics: Methods and Protocols (Methods in Molecular Biology), Humana Press, 2009
G. Ecker et al.: Transporters as Drug Carriers: Structure, Function, Substrates: 44 (Methods and Principles in Medicinal Chemistry), Wiley-VCH, 2009
J. Pawley: Handbook of Biological Confocal Microscopy, Springer, 2006

Course language:

Notes:

Course assessment
Total number of assessed students: 32

N	P
0.0	100.0

Provides: Mgr. Martin Panigaj, Ph.D.

Date of last modification: 03.05.2015

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/MONB/22	**Course name:** Monograph

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

Number of ECTS credits: 20

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Co-author of the monograph.

Learning outcomes:
By publishing a monograph, the PhD student demonstrates a high level of ability to identify, evaluate, and apply correct scientific methods or research methodology. It demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The doctoral student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

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:

Date of last modification: 08.11.2022

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/ MONA/22	**Course name:** Monograph in a renowned publishing house

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

Number of ECTS credits: 40

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Co-author of a monograph in a renowned publishing house.

Learning outcomes:
By publishing a monograph in a renowned publishing house, the PhD student demonstrates a high level of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The doctoral student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

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:

Date of last modification: 08.11.2022

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/NRZ/22	**Course name:** Non-reviewed collections of papers and monographs published abroad or in the country of residence

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

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
A publication published in a non-reviewed foreign or national journal as an author/co-author.

Learning outcomes:
By publishing in a non-reviewed foreign or national journal as an author/co-author, the PhD student demonstrates the ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The phD student demonstrates the ability to finalize his own thoughts in a written speech.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 30

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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: KPE/ PgVU/17	**Course name:** Pedagogy for University Teachers

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
1. Development of a teaching diary—100%
2. Compulsory active participation and attendance in accordance with the Study Regulations.

Learning outcomes:
After completing the course, the student will acquire knowledge, skills, and competencies, i.e., will be able to:
Knowledge
Define and apply basic didactic principles, methods, forms, and tools in the teaching process of university-level professional subjects. Identify and specify educational procedures of a university teacher aimed at effective teaching management, pedagogical diagnostics, and assessment of learning outcomes. Recognize different approaches to pedagogical evaluation and their impact on improving the quality of the educational process at the university level.
Skills
Implement effective educational methods and techniques into the teaching of professional subjects, tailored to the needs of university students. Conduct pedagogical diagnostics, assess students' progress, and apply appropriate evaluation methods to improve learning outcomes. Analyze and reflect on one's own teaching process, identify areas for improvement, and enhance the teaching of professional subjects, including the rationalization of the time and content structure of teaching. Present specific proposals for improving the teaching process, including the use of new technologies and innovative pedagogical approaches.
Competencies
Confidently and effectively manage the teaching of university subjects, applying educational competencies that consider the specifics of higher education. Critically reflect on one's own pedagogical practice and the learning outcomes of students to improve teaching methods and achieve a higher quality of the educational process. Apply innovative solutions to streamline and optimize the teaching process, aiming to increase the engagement and success of university students.

Brief outline of the course:
The personality of a university teacher. Teaching styles. Student in university education. Student learning styles. Possibilities of adapting teaching styles and student learning styles. University teacher–student interaction and communication in the teaching process. Pedagogical competencies

of a university teacher. Didactic analysis of the curriculum; teaching materials and textbooks. Forms of university teaching. Methods of university teaching. Verification methods and student assessment. Creation of a didactic test. Designing university teaching process. University teacher self-reflection.

Recommended literature:

Beránek, J. (2023). Moderní pedagogické metody a přístupy. Praha: Portál.
Fiala, M. (2023). Didaktika a metodika v současné škole. Praha: Grada Publishing.
Kováč, M. (2023). Vzdelávanie v 21. storočí: Inovatívne prístupy a metódy. Nitra: Vydavateľstvo UKF v Nitre.
Koudelka, J. (2023). Moderní didaktika a její aplikace. Praha: Karolinum.
Křížová, M., & Šebová, P. (2023). Vzdělávání učitelů: Teoretické a praktické přístupy. Praha: Triton.
Kučerová, M. (2023). Vzdělávání učitelů a profesionální rozvoj. Praha: Triton.
Mocová, M., & Lázňovská, M. (2023). Pedagogika a jej aplikácie v praxi. Bratislava: Vydavateľstvo Spolku slovenských pedagogických pracovníkov.
Novák, J., & Pol, M. (2024). Pedagogické výzkumy a inovace ve vzdělávání. Praha: Portál.
Sikora, J. (2022). Didaktika a metodika vzdelávania: Nové výzvy a trendy. Bratislava: Vydavateľstvo Univerzity Komenského v Bratislave.
Škoda, J. (2022). Efektivní výuka: Praktické strategie a metody. Praha: Grada Publishing.
Švec, J. (2023). Didaktika a školní politika: Teorie a praxe. Praha: Grada Publishing.
Vojtová, K. (2024). Diferenciace a inkluze ve vzdělávání. Praha: Wolters Kluwer.

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 182

abs	n	neabs
97.8	0.55	1.65

Provides: doc. PaedDr. Renáta Orosová, PhD.

Date of last modification: 22.09.2025

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/RZ/22	**Course name:** Peer-reviewed collections of papers and monographs published abroad or in in the country of residence

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
A publication published in a peer-reviewed foreign or national proceedings as an author/co-author.

Learning outcomes:
By publishing in a peer-reviewed foreign or national journal as an author/co-author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 48

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ EFRd/26	**Course name:** Plant Ecophysiology

Course type, scope and the method:
Course type: Lecture / Practice / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 14s / 56s / 56s / 14s
Course method: present

Number of ECTS credits: 8

Recommended semester/trimester of the course: 2., 4.

Course level: III.

Prerequisities:

Conditions for course completion:
1. Completion of one semester paper on a pre-assigned topic.
2. The course examination is conducted orally, based on a randomly selected question. The student presents the topic of their semester paper, followed by a discussion with the instructor on the given subject.

Learning outcomes:
Updating, expanding, and reinforcing knowledge about the mechanisms of ecophysiological processes in plants. Understanding the relationships and interactions between plants and their environment. Students should be able to carry out and coordinate primarily laboratory, but also field ecophysiological research tasks.

Brief outline of the course:
Direct teaching ("lectures") and practical activities ("seminars") are focused on expanding knowledge and practical skills in 14 topics:
1. Metabolism, metabolome, proteome, transcriptome in vascular plants and applications in plant ecophysiology.
2. Metabolism, metabolome, proteome, transcriptome, their specific features in non-vascular plants and applications in plant ecophysiology.
3. Ecophysiological relationships among plants and between plants and other organisms.
4. Plant communication within the environment.
5. Ecophysiological aspects of plant adaptation.
6. Adaptive evolution.
7. Interactions of microevolutionary and ecophysiological factors in plant adaptations.
8. Ecophysiological aspects of plant mineral nutrition.
9. Redistribution and allocation of biomass in plants in relation to the environment.
10. Modification of the rhizosphere by plants.
11. Physiological factors influencing efficient water use by plants.
12. Reproductive biology, embryology, and plant productivity from the ecophysiological perspective.
13. Plant adaptive mechanisms to climate change.
14. New findings in plant ecophysiology; selected topics from the latest publications in the field.

Practical activities will be organized in blocks and will focus on the demonstration and acquisition of selected techniques by students – selected phenotyping techniques, assessment of antioxidant enzymatic systems, use of flow cytometry to determine certain physiological parameters, modifications of methods for assessing physiological parameters for efficient screening of a large number of samples, techniques for studying plant detoxification strategies, plant cytogenetic transformation techniques, production of isogenetic dihaploid plant lines.
Individual consultations and self-study:
since the selected topics from plant ecophysiology for direct teaching are extensive and focus on both non-vascular and vascular plants, several recommended chapters will, according to the needs and focus of the students' dissertations, be assigned for independent study by students and consultation with instructors.

Recommended literature:
Murphy A.S. et al. The plant plasma membrane. Springer-Verlag Berlin Heidelberg 2011; Taiz L.et al. Plant Physiology and Development. Sixth editon. Sinauer ass.,Sunderland 2014; Bhatla S.C., Lal M.A. Plant Physiology, development and metabolism. Springer Nature Singapore Pte Ltd. 2018;
Scientific articles.

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

abs	n
0.0	0.0

Provides: doc. RNDr. Peter Paľove-Balang, PhD., doc. RNDr. Michal Goga, PhD., prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat., doc. Mgr. Vladislav Kolarčik, PhD.

Date of last modification: 26.02.2026

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/RR/08	**Course name:** Plant Reproduction

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: 8

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Completion of the subject is realized through lectures and self-study of literature. Practical questions are solved in the contexts that currently arise from the topic of the solved dissertation and its connection with plant reproduction. At the end of the lectures, there is an oral exam.

Learning outcomes:
To gain deep knowledge about the evolution of reproductive systems, the mechanisms and processes of reproduction and the impact of different reproductive systems on the evolution of taxa. Be able to synthesize knowledge from plant embryology and evolutionary biology for a better understanding of reproductive biology issues. Learn the influence of ecological factors on plant reproduction and the relationships between plants and animals that relate to plant reproduction. Be able to apply the acquired knowledge to solving various tasks within plant physiology, but also in practical conditions, e.g. in agriculture, forestry, biota assessment and nature conservation.

Brief outline of the course:
1. History of plant reproductive biology.
2. Evolutionary trends in plant reproduction.
3. Reproductive structures of spore and seed plants.
4. Female and male gametophyte. Fertilization, endosperm, embryo.
5. Phenological reproductive data.
6. Ultraviolet reflectance and absorbance of reproductive structures.
7. Pollination vectors. Nectar.
8. Propagation of plants.
9. Reproductive systems of plants. Panmixis, self-fertilization, apomixis.
10. Evolutionary significance of individual breeding systems.
11. Plant reproduction and breeding.
12. Application of knowledge about plant reproduction in agriculture.

Recommended literature:
Cresti M.: Sexual Plant Reproduction. - Springer Science, 2012.
Pullaiah T: Plant Reproduction, 2nd. ed., Scientific Publishers, 2019.
Erdelská O., Švubová R., Mártonfiová L., Lux, A.: Embryológia krytosemenných rastlín, Veda, Bratislava 2017.

Horandl E., Grossniklaus U., van Dijk P. J., Sharbel T. F.: Apomixis. Evolution, Mechanisms and Perspectives. - A.R.G. Gantner Verlag K. G., Rugell, Liechtenstein, 2007.
Richards A.J.: Plant Breeding Systems. 2nd. ed. - Chapman & Hall, London, 1997.
Simpson M. G.: Plant Systematics, 3rd ed. - Academic Press, 2019.
Stuessy T. F., Crawford D. J., Soltis D. E., Soltis P. S.: Plant Systematics. The Origin, Interpretation, and Ordering of Plant Biodiversity. - Koeltz Scienfific Books, 2014.

Course language:

Notes:

Course assessment
Total number of assessed students: 23

N	P
0.0	100.0

Provides: prof. RNDr. Pavol Mártonfi, PhD.

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/MER/22	**Course name:** Plant microevolution

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: III.

Prerequisities:

Conditions for course completion:
1. Active participation in practical exercises.
2. Preparation of semestral work on a topic agreed in advance with the teacher is also a condition for the completion of the course.
3. The examination of the subject takes place orally. Any changes or modifications to the conditions for completing the subject due to the COVID19 pandemic or other serious reasons are continuously published on the course's electronic bulletin board.

Learning outcomes:
After completing the course, the student should understand microevolutionary processes and patterns of plant adaptability in response to various environmental factors in the modern era, the Anthropocene. Emphasis is placed on hybridization and polyploidization as the two main microevolutionary processes of plants, and their consequences in the genetic and cytotype structure of populations. Hybridization and polyploidization lead to the sudden emergence of species, while various processes stabilize or disrupt their emergence. The microevolution of plants is accelerated by intensive environmental change, primarily by human activity. Students will become familiar with the consequences of climate change, polluted environment on the microevolution of plants in natural and anthropogenic landscapes.

Brief outline of the course:
1. Biological evolution. Natural and sexual selection. Heredity. Mutations. Speciation and phylogenetics. Macro- and micro-evolution of plants. Speciation genes. Overview of evolutionary processes in algae, fungi, bryophytes, seedless and seed vascular plants. Evolutionary drives.
2. Population, population structure, genetic flow. Study of population history, identification of genetic lineages and their genetic, morphological and spatial differentiation in relation to the evolutionary history of the species and biological processes.
3. Plant nuclear genome. Genome size, phenotype. Transposons. Genome obesity, genome downsizing.
4. Cytogenetics, accessory chromosomes and microevolution. Genomic rearrangements accompanying microevolutionary processes.

5. Ecological changes and microevolutionary responses of plants. Evolution of the ecological niche of plants. Invasive plants and their interaction with native species. Critically endangered plant species. Microevolution of plants in a stressful environment.
6. Evolutionary trends of plants, hybridization and polyploidization. Basic terms, homoploid hybrids, auto- and allo-polyploidization. Natural and anthropogenically influenced origin of polyploids. Microevolution in the Anthropocene.
7. Polyploidization and microevolution of populations. Cytotypialy pure and mixed populations, primary and secondary contact zone of cytotype different subpopulations. Cytotypicaly differentiated species. "Triploid block" and "triploid bridge". Reproductive isolation. The principle of "minority cytotype exclusion".
8. Genome multiplication and microevolutionary processes in plant physiology. Transcriptomic, proteomic and metabolomic patterns in examples.
9. Reproductive ecology. Interaction of sexually and asexually reproducing individuals. Interaction of pollen grains, "mentor effect". Apomeiosis, pseudogamy and microevolutionary impact on populations and species.
10. Emergence of reproduction-isolation barriers. Prezygotic and postzygotic barriers. Pollinator-plant relationship. Coevolutionary patterns in plant microevolution. Founder effect, genetic drift and adaptive radiation.
11. Microevolution in an agrarian landscape I. Mutual interactions between wild plants and their cultural, cultivated, evolutionarily related crops.
12. Microevolution in an agrarian landscape II. Mutual interactions between the environment, animals and cultural, cultivated crops. Assessing the risks of a managed landscape to biodiversity and biodisparity from a microevolutionary point of view.
13. Climate changes, pollutants, toxic substances in the environment and the effect on plant communities and the rate of plant evolution.

Recommended literature:

Briggs: Plant Microevolution and Conservation in Human-influenced Ecosystems (2009)
Wendel J.F.: Plant Genome Diversity, Vol. 1 (2014)
Briggs a Walters: Plant variation and evolution (2016)
Szulkin et al.: Urban Evolutionary Biology (2020)
Templeton: Population Genetics and Microevolutionary Theory (2021)

Course language:

Notes:

Course assessment

Total number of assessed students: 2

N	P
0.0	100.0

Provides: doc. Mgr. Vladislav Kolarčik, 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/ POP/22	**Course name:** Popularisation of science

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Active involvement in the popularization of science.

Learning outcomes:
Demonstrated ability to present science to the lay public, use interactive methods of scientific communication, identify the target group and adapt the communication language to the level of professional knowledge. A PhD student is able to arouse interest and motivate specific target groups in the field of his scientific work, but also in the wider context of science.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 83

abs	n
98.8	1.2

Provides:

Date of last modification: 08.11.2022

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/VYS/22	**Course name:** Presentation at the seminar

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Presentation at the seminar

Learning outcomes:
By actively participating in the seminar, the PhD student demonstrates the ability to identify, evaluate, and apply correct scientific methods or research methodology in his field of study. He demonstrates the ability to reflect on a specific scientific problem by using the latest approaches and applying them critically. Demonstrates competence in using existing theories and concepts in an innovative way, as well as generating new original scientific knowledge and communicating research results by adequate means and through Slovak or a foreign language.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 79

abs	n
98.73	1.27

Provides:

Date of last modification: 08.11.2022

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/ZRIG/22	**Course name:** Principal investigator of an internal grant (VVGS)

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

Number of ECTS credits: 10

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Principal investigator of an internal grant (VVGS)

Learning outcomes:
The PhD student demonstrates the ability to process a successful application for his own research problem within the internal grant system at UPJŠ. Acquires skills with the design of research stages, their time schedule, measurable outputs and adequate distribution of funds. The very solution of the internal VVGS grant acquires the ability to implement the project intention according to the established procedure, to be responsible for achieving the set outputs. As a responsible researcher, the PhD student acquires competencies in project management, its administration, and presentation of results.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 32

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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: KPPaPZ/PsVU/17	**Course name:** Psychology for University Lecturers

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Case study, micro-output, its analysis
Current modifications of the course are listed in the electronic bulletin board of the course.

Learning outcomes:
After completing the course, students will gain knowledge that allows them to understand, summarize and explain selected psychological knowledge from cognitive psychology, emotion and motivation psychology, personality psychology, developmental, social, educational psychology and health psychology. They will acquire skills to apply the above psychological knowledge necessary for the professional, competent performance of university teaching practice of doctoral students to create and implement the teaching of a professional topic with applied psychological knowledge and develop the competences to create and implement teaching of a professional topic with the application of psychological knowledge, as well as to evaluate their performance and the performance of their classmates in the form of constructive feedback.

Brief outline of the course:
The content of the course is based on selected psychological knowledge of cognitive psychology, psychology of emotions and motivation, personality psychology, developmental, social, educational psychology and health psychology. Teaching is realized by a combination of lectures with interactive, experiential methods, discussion, open communication with mutual respect, support of independence, activity and motivation of students. Syllabus: University teacher and his work in the teaching process with a focus on: teachers in relation to themselves (cognitive, personal, social and competencies in the use of methods), in relation to students and as part of the teacher-student relationship on the basis of selected areas of cognitive psychology, psychology of emotions and motivation, developmental psychology, social psychology, educational psychology and health psychology with application to the university environment

Recommended literature:
Alexitch, L. R. (2005). Applying social psychology to education. Social Psychology.–Ed.: Schneider F., Gruman J., Coutts L.–Sage Publications, Inc, 205-228.
Fry, H., Ketteridge, S., & Marshall, S. (2008). A handbook for teaching and learning in higher education: Enhancing academic practice. Routledge.
Mareš, J.: Pedagogická psychologie. Portál, 2013.

Kniha psychologie. Universum, 2014
Čáp, J., Mareš, J.: Psychologie pro učitele. Praha: Portál 2007.
Vágnerová, M.: Školní poradenská psychológie pro pedagogy. Praha: Karolínum 2005.
Cuevas, J. A., Childers, G., & Dawson, B. L. (2023). A rationale for promoting cognitive science in teacher education: Deconstructing prevailing learning myths and advancing research-based practices. Trends in neuroscience and education, 100209.

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 108

abs	n	neabs
99.07	0.0	0.93

Provides: Mgr. Marta Dobrowolska Kulanová, PhD.

Date of last modification: 09.12.2024

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/Q1SA/22	**Course name:** Q1 journal as co-author

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

Number of ECTS credits: 30

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Publication accepted in a journal of category Q1 as co-author.

Learning outcomes:
By publishing in a journal of category Q1 as a co-author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 20

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/Q11A/22	**Course name:** Q1 journal as first or corresponding author

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

Number of ECTS credits: 40

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Publication accepted in a journal of category Q1 as first or corresponding author.

Learning outcomes:
By publishing in a journal of category Q1 as the first or corresponding author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 12

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/Q2SA/22	**Course name:** Q2 journal as co-author

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

Number of ECTS credits: 20

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Publication accepted in a journal of category Q2 as co-author.

Learning outcomes:
By publishing in a journal of category Q2 as a co-author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 16

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/Q21A/22	**Course name:** Q2 journal as first or corresponding author

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

Number of ECTS credits: 30

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Publication accepted in a journal of category Q2 as first or corresponding author.

Learning outcomes:
By publishing in a journal of category Q2 as the first or corresponding author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 12

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ Q3SA/22	**Course name:** Q3 journal as co-author

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

Number of ECTS credits: 15

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Publication accepted in a journal of category Q3 as co-author

Learning outcomes:
By publishing in a journal of category Q3 as a co-author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 4

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ Q31A/22	**Course name:** Q3 journal as first or corresponding author

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

Number of ECTS credits: 25

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Publication accepted in a journal of category Q3 as first or corresponding author

Learning outcomes:
By publishing in a journal of category Q3 as the first or corresponding author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 3

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ Q4SA/22	**Course name:** Q4 journal as co-author

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

Number of ECTS credits: 10

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Publication accepted in a journal of category Q4 as co-author.

Learning outcomes:
By publishing in a journal of category Q4 as a co-author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 4

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ Q41A/22	**Course name:** Q4 journal as first or corresponding author

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

Number of ECTS credits: 20

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Publication accepted in a journal of category Q4 as first or corresponding author.

Learning outcomes:
By publishing in a journal of category Q4 as the first or corresponding author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 2

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ MVDPd/26	**Course name:** Research Methodology for the Doctoral Dissertation

Course type, scope and the method:
Course type: Lecture / Practice / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 14s / 14s / 28s / 28s
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Completion of a methodological plan proposal for a selected part of the doctoral dissertation.

Learning outcomes:
By completing the course Research Methodology for the Doctoral Dissertation, the student will gain up-to-date knowledge of methodological approaches for addressing complex research questions in plant physiology and will acquire the skills to process and present scientific results of their work in the form of a peer-reviewed scientific publication.

Brief outline of the course:
Direct teaching ("lectures") and practical activities ("seminars") are focused on expanding knowledge and practical skills in 14 topics:
1. Doctoral dissertation, definition of research objectives, outline of publication outputs.
2. Research project proposal, grant schemes for students.
3. Cooperation, partial tasks, schedule, and feedback control of the progress of a research project.
4. Ethical standards of scientific research.
5. Hypothesis formulation, experimental and observational data.
6. Analysis of methodological aspects of doctoral dissertation preparation.
7. Design of complex experiments, planning laboratory and fieldwork procedures.
8. Analysis of experimental and observational data in plant biology.
9. Advanced methods for evaluation of complex datasets and limits of their interpretation.
10. Visualization techniques for complex data.
11. Preparation of publications, formal aspects of scientific outputs.
12. Selection of the target scientific journal, tools for targeted selection.
13. Processing and presentation of doctoral research results.
14. Scientific publishing process and peer-review procedure.

Practical activities include solving practical tasks aimed at developing the presentation of students' independent work results on the topics of their dissertation projects, within the individual thematic areas presented during direct teaching.
Individual consultations and self-study: selected topics will be recommended for self-study and subsequent consultation with instructors. These will primarily be topics focused on the evaluation, processing, and presentation of the expected observational and experimental data of the students.

Individual consultations will also concern the possible preparation of students' grant projects or the processing of their existing partial results in the context of the themes presented in direct teaching.

Recommended literature:
Scientific articles.
Valid internal regulations of UPJŠ on research ethics.
https://www.upjs.sk/informacie/vyskum/vedeckovyskumna-cinnost/etika/
Európsky kódex etiky a integrity výskumu, Revidované vydanie. Európska federácia akadémií vied ALLEA - All European Academies, Berlín 2018: https://www.upjs.sk/app/uploads/2022/09/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2018-Slovak-dig.pdf

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

abs	n
0.0	0.0

Provides: doc. RNDr. Peter Paľove-Balang, PhD., doc. RNDr. Michal Goga, PhD., prof. Dr. rer. nat. Marko Sabovljević, Dr. rer. nat., doc. Mgr. Vladislav Kolarčik, PhD.

Date of last modification: 26.02.2026

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/ VPZ/22	**Course name:** Scientific work after sending to the editorial office
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion: Scientific work after being sent to the editorial office as an author/co-author.	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 15	

abs	n
100.0	0.0

Provides:
Date of last modification: 08.11.2022
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/ SMR/08	**Course name:** Secondary metabolism of plants

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

Number of ECTS credits: 6

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
1. Elaboration of one term paper on a pre-specified topic.
2. The examination of the subject takes place in an oral form on a randomly drawn question. The student will present the topic of his term paper and then a discussion will take place with the teacher on the given topic.

Learning outcomes:
The student updates, expands and consolidates knowledge about the biosynthesis of secondary substances in plants with an emphasis on their accumulation, regulation and significance for both plants and humans. Demonstration of the ability to work with scientific literature and process the informations.

Brief outline of the course:
1. Primary and secondary metabolism of plants and their biosynthesis
2. Enzymatic pathways and enzyme complexes (metabolons).
3. Terpenes
4. Phenolic substances, formation of lignins
5. Flavonoids, isoflavonoids
6. Condensed tannins, anthocyanins
7. Nitrogenous secondary substances, alkaloids
8. Polyketides
9. Secondary substances in conditions of stress
10. Extraction of secondary substances, polarity.
11. Absorption properties of substances, UV-VIS spectrum
12. Analysis of secondary substances
13. New knowledge about plant metabolites, a selected topic from the latest publications in the field.

Recommended literature:
Wink M, Biochemistry of Plant Secondary Metabolism. Sheffield Academic Press .
Wink M, Functions of Plant Secondary Metabolites and their Expoitation in Biotechnology. Sheffield Academic Press 1999.
Taiz L, Zeiger E, Plant Physiology. 4th ed. Sunderland, Sinauer Ass. 2006

Course language:	
Notes:	
Course assessment Total number of assessed students: 25	
N	P
0.0	100.0
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/ VKFR/08	**Course name:** Selected Plant physiology chapters

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

Number of ECTS credits: 8

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:
1. Elaboration of one term paper on a previously assigned topic.
2. The examination of the subject takes place in an oral form on a randomly drawn question. The student will present the topic of his term paper and then a discussion will take place with the teacher on the given topic.

Learning outcomes:

Brief outline of the course:
1. Metabolism, metabolome, transcriptome and their significance for plant physiology.
2. Photosynthesis: the influence of light on plant growth and development, response to ecological factors
3. Photosynthesis II: Enzyme Rubisco and its importance for photosynthetic processes. Metabolic adaptations and their significance for plants.
4. Plant membranes and their physiological significance. Transport processes of plants.
5. Nitrogen intake, nitrogen reduction and their regulation, function of NO and other nitrogenous substances.
6. Primary and secondary assimilation of nitrogen, regulation of nitrogen and carbon metabolism. Connections between photosynthesis and nitrogen metabolism.
7. Amino acids, their formation, transport, accumulation and importance of free amino acids
8. Importance of catabolic processes in plant leaves
9. Lipid metabolism, importance of lipids, lipid peroxidation. Stress hormones, jasmonates
10. Oxidative stress, antioxidants and enzymes.
11. Stress metabolites, phytoalexins
12. Regulation of plant flowering, plant biorhythms
13. New knowledge from plant physiology, selected topic from the latest publications in the field.

Recommended literature:
Murphy A.S. et al. The plant plasma membrane. Springer-Verlag Berlin Heidelberg 2011;
Taiz L.et al. Plant Physiology and Development. Sixth editon. Sinauer ass.,Sunderland 2014;
Bhatla S.C., Lal M.A. Plant Physiology, development and metabolism. Springer Nature Singapore Pte Ltd. 2018;
Papers in scientific journals.

Course language:	
Notes:	
Course assessment Total number of assessed students: 33	
N	P
0.0	100.0
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: ÚCHV/ VKBM/13	**Course name:** Selected Topics in Biochemistry of Microorganisms

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 4 / 2 **Per study period:** 56 / 28
Course method: present

Number of ECTS credits: 8

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Elaboration of a seminar paper on a topic related to the subject biochemistry of microorganism and the topic of the student's doctoral studies. A discussion with the examiner about the topic of the seminar work, in which the student is given the opportunity to prove that they possess sufficient knowledge of the subject.

Learning outcomes:
Familiarize postgraduate students with newest knowledge from Biochemistry of microorganism.

Brief outline of the course:
Diversity of microbial world – microbial evolution, taxonomy and diversity.
Ecology and symbiosis – Biogeochemical cycling and introductory microbial ecology, microbial interactions.
Antimicrobial chemotherapy – development of chemotherapy, general characteristics of antimicrobial drugs, determining the level of antimicrobial activity, antibacterial drugs, factor influencing antimicrobial drug effectiveness, drug resistance, antifungal, antiviral and antiprotozoal drugs.
Food and industrial microbiology – microbiology of food, food-borne pathogens.
Applied and industrial microbiology – microorganisms used in industrial microbiology, major products of industrial microbiology.

Recommended literature:
1. Black, J. G.: Microbiology, Wiley & Sons, Inc., 2008.
2. Johnson, T. R., Case, J.: Laboratory Experiments in Microbiology, 9th Ed., Pearson, 2010.
3. Kayser, F. H., Bienz, K. A., Eckert, J., Zinkernagel, R. M.: Medical Microbiology, Thieme, Stitgart-New York, 2001.
4. Levinson, W.: Review of Medical Microbiology and Immunology, McGraw-Hill International Edition, 2010.
5. Willey, J. M., Sherwood, L. M., Woolverton, C. J.: Prescott, Harley, and Klein´s Microbiology, McGraw-Hill International Edition, 2008.

Course language:
English

Notes:
Teaching is carried out either face-to-face or remotely/hybrid learning using the MS Teams program. The teaching format is specified by the teacher at the beginning of the semester and updated continuously.

Course assessment
Total number of assessed students: 16

N	P
0.0	100.0

Provides: prof. RNDr. Mária Kožurková, CSc.

Date of last modification: 07.03.2023

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/ SSOL/04	**Course name:** Self-motivated Study on Scientific Literature
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** distance, present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 300	
abs	n
100.0	0.0
Provides:	
Date of last modification:	
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: Dek. PF UPJŠ/JSD/14	**Course name:** Spring School for PhD Students

Course type, scope and the method:
Course type: Lecture
Recommended course-load (hours):
Per week: Per study period: 4d
Course method: distance, present

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Active participation in the Spring School of PhD students of UPJŠ.

Learning outcomes:
By actively participating in the Spring School of PhD Students of UPJŠ, the PhD student demonstrates a high level of ability to process the issues of his dissertation for a multidisciplinary audience with an emphasis on clarifying the motivation, scientific problem, processing methodology and own contribution to the solution of the selected topic. The PhD student demonstrates the ability to professionally discuss various research topics, present his own positions and accept a plurality of opinions. Demonstrates the ability to communicate research results to a wider professional audience with adequate means and through the Slovak language.

Brief outline of the course:
1. Interdisciplinary lectures from the fields of medicine, natural sciences, law, public affairs, humanities. Lecturers - top foreign or national experts from the mentioned fields.
2. Scientific lectures in sections created within related disciplines. Lecturers - top experts from UPJŠ from the mentioned fields.
3. Scientific contributions of PhD students in sections of related fields.
4. Panel discussions on the issue of PhD studies and current trends in the development of scientific disciplines at UPJŠ.

Recommended literature:
Proceedings of the Spring School of Doctoral Students.

Course language:

Notes:

Course assessment
Total number of assessed students: 218

abs	n
100.0	0.0

Provides: doc. RNDr. Marián Kireš, PhD.

Date of last modification: 08.11.2022
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/VPSV/22	**Course name:** Supervision of Student's Scientific Activity

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

Number of ECTS credits: 8

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Supervision of Student's Scientific Activity

Learning outcomes:
By guiding a student within the SOČ or ŠVOČ, the PhD student demonstrates broad and scientifically based knowledge in the field of study, as well as knowledge of a wide range of methods and approaches. Demonstrates the ability to critically assess a professional problem and its proposed solution, as well as to evaluate it and possibly propose another solution. He applies knowledge and skills from the field of pedagogical sciences to his own field.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 6

abs	n
83.33	16.67

Provides:

Date of last modification: 08.11.2022

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/ PPC1/22	**Course name:** Teaching activities 1h/s

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

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Direct teaching activity 1 semester hour

Learning outcomes:
Through pedagogical activity, the PhD student demonstrates the ability to transfer and integrate knowledge from his own field of study into education. He is able to select and apply the right techniques and strategies of study group management, higher education and evaluation of learning outcomes. He is capable of designing and implementing part of the educational process in accordance with current trends in higher education and the requirements placed on the level of communication and digital competencies.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 8

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ PPC2/22	**Course name:** Teaching activities 2 h/s

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

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Direct teaching activity 2 semester hours

Learning outcomes:
Through pedagogical activity, the PhD student demonstrates the ability to transfer and integrate knowledge from his own field of study into education. He is able to select and apply the right techniques and strategies of study group management, higher education and evaluation of learning outcomes. He is capable of designing and implementing part of the educational process in accordance with current trends in higher education and the requirements placed on the level of communication and digital competencies.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 23

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ PPC3/22	**Course name:** Teaching activities 3 h/s

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

Number of ECTS credits: 6

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Direct teaching activity 3 semester hours

Learning outcomes:
Through pedagogical activity, the PhD student demonstrates the ability to transfer and integrate knowledge from his own field of study into education. He is able to select and apply the right techniques and strategies of study group management, higher education and evaluation of learning outcomes. He is capable of designing and implementing part of the educational process in accordance with current trends in higher education and the requirements placed on the level of communication and digital competencies.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 14

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/ PPC4/22	**Course name:** Teaching activities 4 h/s

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

Number of ECTS credits: 8

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Direct teaching activity 4 semester hours

Learning outcomes:
Through pedagogical activity, the PhD student demonstrates the ability to transfer and integrate knowledge from his own field of study into education. He is able to select and apply the right techniques and strategies of study group management, higher education and evaluation of learning outcomes. He is capable of designing and implementing part of the educational process in accordance with current trends in higher education and the requirements placed on the level of communication and digital competencies.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 23

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/KZP/22	**Course name:** Thesis consultant

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

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Final thesis consultant.

Learning outcomes:
By consulting the final thesis, the PhD student demonstrates broad and scientifically based knowledge in the field of study, as well as knowledge of a wide range of methods and approaches. Demonstrates the ability to critically assess a professional problem and its proposed solution, as well as to evaluate it and possibly propose another solution. He applies knowledge and skills from the field of pedagogical sciences to his own field.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 37

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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/VZP/22	**Course name:** Thesis supervising

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

Number of ECTS credits: 8

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Supervisor of the final thesis.

Learning outcomes:
By supervising the final thesis, the PhD student demonstrates broad and scientifically based knowledge in the field of study, as well as knowledge of a wide range of methods and approaches. Demonstrates the ability to critically assess a professional problem and its proposed solution, as well as to evaluate it and possibly propose another solution. He applies knowledge and skills from the field of pedagogical sciences to his own field.

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 17

abs	n
100.0	0.0

Provides:

Date of last modification: 08.11.2022

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