CONTENT

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ PMBd/26	**Course name:** Advanced Microscopic Methods in Biology

Course type, scope and the method:
Course type: Lecture / Practice / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 12s / 42s / 36s / 10s
Course method: present

Number of ECTS credits: 6

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

Course level: III.

Prerequisities:

Conditions for course completion:
The study takes place in the form of lectures, consultations, practical activities and the self-study of literature. Throughout the whole course of study, the student will complete: 12 hours of lectures, 10 hours of consultations, 42 hours of practical activities and 36 hours of self-study. The evaluation of the course is carried out individually according to the doctoral student's study plan and on the basis of mastering the necessary amount of knowledge of advanced microscopy methods applied in biology research, related to the topic of the dissertation thesis. The assessment of the course is standard and reflects the student's orientation in the subject with a pass/fail mark.

Learning outcomes:
By completing the course, students will acquire knowledge in the field of advanced imaging techniques applied in biology research, including knowledge on selection of appropriate experimental model for the study design, ethical frame of biological experiments, processing of microphotographs and quantitative analyses. Students will acquire knowledge in the field with emphasis on the project of dissertation thesis in accordance with the specifics of the individual topics. The course also aims to promote students in self-study of literature and independent search for relevant scientific information.

Brief outline of the course:
The subject Advanced Microscopic Methods in Biology covers study activities of doctoral student and has partly individual character taking into account specificity of the topic of dissertation thesis. Basic syllabus is determined as follows: Design of biological experiment, legislative and ethic aspects of biological experiments. Formulation of scientific hypothesis and strategy of suitable experimental method to reach the aims of experiment. Selection of appropriate experimental model to reach the aims of experiment. Selection of appropriate method for isolation and processing of biological material (isolation, fixation, freezing, processing and sectioning of biological sample). Immunolabelling for light, fluorescent and electron microscopy. Design and preparation of probes for in situ hybridization. Methods of visualization of the sample using epifluorescent microscopy. Methods of visualization of the sample using transmission electron microscopy. Methods of visualization of the sample using scanning electron microscopy. Application of transgenic animals in experimental research. Image processing using ImageJ software, generation of image output. Quantification and statistical analysis.

Recommended literature:

1. Šachl and Amaro: Fluorescence Spectroscopy and Microscopy in Biology, Springer Series on Fluorescence, Springer Cham, (2023), 978-3-031-30361-6
2. Michler: Compact Introduction to Electron Microscopy. essentials. Springer, Wiesbaden. (2023) ISSN 2197-6708,
3. Yau et al: Principles of deep immunohistochemistry for 3D histology, Cell Reports Methods, 3 (5), (2023) ISSN 2667-2375,
4. Nielsen and Jones (eds.): In Situ Hybridization Protocols, Methods in Molecular Biology, Springer Science+Business Media LLC, vol. 2148 (2020).

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

abs	n
0.0	0.0

Provides: RNDr. Ján Košuth, PhD., RNDr. Anna Alexovič Matiašová, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ ACM/12	**Course name:** Analytical Cytometry
Course type, scope and the method: **Course type:** Lecture / Practice **Recommended course-load (hours):** **Per week:** 1 / 2 **Per study period:** 14 / 28 **Course method:** present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course:	
Course level: II., III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes: The goal of the course is to teach the students fundamental theoretical and practical aspects of analytical cytometry. The course covers multiple areas of methods in microscopy with special focus on flurescence and its application in confocal microscopy, morphometric measurements and their applications in cytology, determination of vital parameters and live cell imaging, basic methods for sample preparation etc.	
Brief outline of the course: 1.) Fundamentals of fluorescent methods, principles of fluorescence. 2.) Principles of confocal microscopy 3.) Principles of flow cytometry. 4.) Cell sorting. 5.) Analyses on living cells – principles, hardware requirements. 6.) Methods for vital parameters. 7.) Analyses, imaging methods with regard to lipids, cytoskeleton dynamics or cell division. 8.) Fluorescent dyes and their applications in analytical cytometry. 9.) Staining of nucleic acids, lipids, proteins, cytosceleton stainings, visualization of cell organelles. 10.) Vital stainings. 11.) Membrane transport. 12.) Reactive oxygen and nitrogen species (ROS, NOS). 13.) Mitochodrial membrane potential, pH etc.	
Recommended literature: 1. R.D. Goldman a kol.: Live Cell Imaging – A Laboratory Manual, Cold Spring Harbour Laboratory Press, 2010 2. J.B. Pawley a kol.: Handbook of Biological Confocal Microscopy, Springer, 2006 3. D. Anselmetti a kol.: Single Cell Analysis, Wiley-Blackwell, 2009 4. A. Hibbs a kol.: Confocal Microscopy for Biologists, Kluwer Academic/Plenum Publishers, 2004	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 46

A	B	C	D	E	FX	N	P
2.17	0.0	0.0	0.0	0.0	0.0	0.0	97.83

Provides: doc. RNDr. Rastislav Jendželovský, PhD.

Date of last modification: 19.02.2024

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ ACMd/26	**Course name:** Analytical cytometry

Course type, scope and the method:
Course type: Practice / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 70s / 20s / 10s
Course method: present

Number of ECTS credits: 6

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

Course level: III.

Prerequisities:

Conditions for course completion:
The study takes place partly in the form of consultations, practical activities and self-study. Throughout the course of study, the student will complete 10 hours of consultations, 70 hours of practical activities and 20 hours of self-study. The evaluation of the course is carried out individually according to the doctoral student's study plan and on the basis of mastering the necessary amount of knowledge of analytical cytometry in relation to the topic of the dissertation. The assessment of the course is standard and reflects the student's sufficient orientation in the subject with a pass/fail mark.

Learning outcomes:
By completing the course, students will acquire the necessary amount of knowledge of molecular cytology and sufficient orientation in the subject with emphasis on the focus of the dissertation project in accordance with the specifics of the individual topics. This knowledge represents an extension of the basic knowledge of practical aspects of analytical cytometry, acquired in the basic subject, with an emphasis on several areas of cytometric methods and their use in determining vital and morphometric parameters of cells.

Brief outline of the course:
The course Analytical Cytometry is a part of the doctoral student's study activities and has a partly individual character with regard to the specificity of the individual topics of the dissertation. The basic curriculum is determined as follows: Basics of fluorescence methods and principles of fluorescence. Principle of confocal microscopy. Principle of flow cytometry. Cell sorting. Methods for analysis of vital parameters. Fluorescent dyes and their use in analytical cytometry. Staining of nucleic acids, lipids, proteins, cytoskeleton, individual cell organelles. Determination of viability. Determination of membrane transport. Analysis of ROS and NOS. Determination of mitochondrial membrane potential.

Recommended literature:
1. Goldman RD a kol., Live cell imaging – A laboratory manual, Cold Spring Harbour Laboratory Press, 2010
2. Pawley JB a kol., Handbook of biological confocal microscopy, Springer, 2006
3. Anselmetti D. a kol., Single cell analysis,Wiley-Blackwell, 2009.

Course language:

Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

abs	n
0.0	0.0

Provides: doc. RNDr. Rastislav Jendželovský, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ AFCM/22	**Course name:** Application of flow cytometry in research

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

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
100% participation. Test from lectures and practicals.

Learning outcomes:
To get acquainted of students with practical aspects of flow cytometry. The course covers the theoretical foundations and practical use of selected methods in the field of scientific research.

Brief outline of the course:
1.) Fluorophores used in cell cycle analysis. 2.) Double staining methods as extensions to cell cycle analysis. 3.) Phosphatidylserine translocation and viability. 4.) Expression and activity of Bcl-2 family members, mitochondrial membrane potential. 5.) Cytochrome c, caspase activity, cleavage of cytokeratin 18. 6.) Fluorophores used in detection of reactive oxygen species. 7.) Methods of evaluation of heterogeneity and resistance of cancer cells: analysis of ABC transporters activity (side population). 8.) Activity of aldehyddehydrogenase. 9.) Immunophenotypisation of heterogeneous populations using CD markers. 10.) Sorting of cell populations using FACS to monitor selected features of cells (single cell cloning, migration). 11.) Flow cytometry in plant cytogenetics: 1. DNA content / genome size determination, applications in evolution, ecology and reproduction biology.
12.) Flow cytometry in plant cytogenetics: 2. Polyploidy at the cellular, tissue and organism level.
13.) Flow cytometry in plant cytogenetics: 3. Flow karyotyping, sizing of chromosomes as initial step towards chromosome sorting and genome sequencing.

Recommended literature:
1. H.M. Shapiro, Practical Flow cytometry, WILEY-LISS, 2003. (ISBN:0-471-41125-6)
2. A.L. Givan, Flow Cytomtery: First principles, WILEY-LISS, 2001, (ISBN 0-471-22394-8)

Course language:
slovak, english

Notes:

Course assessment
Total number of assessed students: 9

N	P
0.0	100.0

Provides: doc. RNDr. Rastislav Jendželovský, PhD., doc. Mgr. Vladislav Kolarčik, PhD., RNDr. Viktória Dečmanová, PhD.

Date of last modification: 08.09.2021

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ AFCMd/26	**Course name:** Application of flow cytometry in research

Course type, scope and the method:
Course type: Practice / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 70s / 20s / 10s
Course method: present

Number of ECTS credits: 6

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

Course level: III.

Prerequisities:

Conditions for course completion:
The study takes place partly in the form of consultations, practical activities and self-study. Throughout the course of study, the student will complete 10 hours of consultations, 70 hours of practical activities and 20 hours of self-study. The evaluation of the course is carried out individually according to the doctoral student's study plan and on the basis of mastering the necessary amount of knowledge of flow cytometry in relation to the topic of the dissertation. The assessment of the course is standard and reflects the student's sufficient orientation in the subject with a pass/fail mark.

Learning outcomes:
By completing the course, students will acquire the necessary amount of knowledge of molecular cytology and sufficient orientation in the subject with emphasis on the focus of the dissertation project in accordance with the specifics of the individual topics. This knowledge represents an extension of the basic knowledge of practical aspects of flow cytometry, acquired in the basic subject, with a focus on the use of selected methods in the field of scientific research. The course also aims to promote self-study and independent search for scientific information.

Brief outline of the course:
The course Applications of flow cytometry in research is a part of the doctoral student's study activities and has a partly individual character with regard to the specificity of the individual topics of the dissertation. The basic curriculum is determined as follows: Fluorophores used for cell cycle analysis. Extensions to cell cycle analysis (double staining). Phosphatidylserine translocation and viability. Detection of expression and activation of Bcl-2 family proteins, mitochondrial membrane potential. Cytochrome c, caspase activation, cytokeratin 18 cleavage. Analysis of ABC transport protein activity (side population). Aldehyde dehydrogenase activity. Immunophenotyping of heterogeneous populations using CD markers. Sorting of cell populations using FACS to monitor selected cell properties (clonogenicity of individual cells, migratory ability). DNA content, genome size and applications in ecology, evolutionary and reproductive biology. Polyploidy at the cell, tissue and organism levels. Flow karyotyping and chromosome size as the initial step of chromosome sorting and genome sequencing.

Recommended literature:
1. H.M. Shapiro, Practical Flow cytometry, WILEY-LISS, 2003. (ISBN:0-471-41125-6)
2. A.L. Givan, Flow Cytomtery: First principles, WILEY-LISS, 2001, (ISBN 0-471-22394-8)

3. Dolezel, Jaroslav / Greilhuber, Johann / Suda, Jan (eds.): Flow Cytometry with Plant Cells, Willey-VCH, 2007, (ISBN: 978-3-527-31487-4)

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

abs	n
0.0	0.0

Provides: doc. RNDr. Rastislav Jendželovský, PhD., doc. Mgr. Vladislav Kolarčik, PhD., RNDr. Jana Vargová, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ AFGd/26	**Course name:** Applied Functional Genomics

Course type, scope and the method:
Course type: Lecture / Practice / Controlled study hour
Recommended course-load (hours):
Per week: Per study period: 10s / 10s / 100s
Course method: present

Number of ECTS credits: 7

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

Course level: III.

Prerequisities:

Conditions for course completion:
The course is delivered partly through lectures and predominantly through self-study. Over the entire duration of the course, the student completes 10 hours of lectures, 10 hours of practical activities and/or consultations, and 100 hours of self-study. Assessment is carried out individually, based on the student's mastery of knowledge in the field of applied functional genomics. It includes active participation in direct instruction (minimum 80%), a presentation of the student's own project related to the topic of the PhD dissertation (bioinformatic analysis, experimental design), or a presentation of a scientific article related to the dissertation topic. The final evaluation reflects the student's sufficient competence in the subject matter and is expressed as pass/fail.

Learning outcomes:
By completing the course, students acquire comprehensive knowledge and an overview of the principles, methods, and applications of functional genomics, with a focus on experimental and bioinformatic (in silico) approaches used in the study of gene functions, gene expression, and the regulation of gene expression. Graduates of the course understand the principles and methodologies of functional genomics, are able to analyze and interpret omics data, and understand the possibilities of applying these approaches in their own research. They are able to critically evaluate the results of scientific studies in the field of genomics and can integrate experimental and in silico approaches in a multidisciplinary manner. The acquired knowledge builds upon and extends the foundational concepts covered in the master's course Functional Genomics, with emphasis on their practical application in biomedical, biotechnological, and environmental research. The course also develops the students' ability to independently search for, analyze, and critically assess scientific information, thereby supporting the development of scientific autonomy and subject-matter competence in alignment with the focus of the PhD dissertation project and the specifics of individual research topics.

Brief outline of the course:
Introduction to functional and applied genomics – integration of the genome, epigenome, transcriptome, proteome, metabolome, and phenotype; distinctions between structural and functional genomics with regard to applications in translational research.
Experimental approaches in functional genomics and bioinformatic processing of omics data.

Sequencing techniques (genome, epigenome, transcriptome, and metatranscriptome sequencing), prediction of gene functions, regulatory mechanisms, epigenetic modifications, and interactions. Selection of methods in accordance with the focus of the PhD dissertation project (e.g., fundamentals of RNA-seq analysis, advanced metabolomic data analysis, multi-omics data integration, use of biological databases and tools, etc.).
Applications of functional genomics – genome organization specifics in selected groups of organisms (e.g., humans, plants, fungi), personalized medicine, functional analysis of genes associated with human diseases, genomic and epigenetic approaches in biotechnology and agriculture.
Ethical, methodological, and practical aspects – ethical issues related to genome manipulation (e.g., in plants), potential risks and benefits for the environment and society.

Recommended literature:

1. Haddad, Luciana Amaral (ed.). Human Genome Structure, Function and Clinical Considerations. Cham: Springer, 2021. ISBN 978-3-030-73150-2. DOI: 10.1007/978-3-030-73151-9
2. National Human Genome Research Institute. (2024, May 29). About Genomics. U.S. Department of Health & Human Services. Retrieved from https://www.genome.gov/about-genomics
3. National Human Genome Research Institute. (2025, March 19). The Human Genome Project. U.S. Department of Health & Human Services. Retrieved from https://www.genome.gov/human-genome-project
4. Cullis, C. A. (2025). Plant genomics. John Wiley & Sons. ISBN 1394211554.

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: doc. RNDr. Katarína Bruňáková, PhD., RNDr. Linda Petijová, PhD., RNDr. Miroslava Bálintová, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

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

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

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

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 75

A	B	C	D	E	FX	N	P
62.67	14.67	10.67	2.67	0.0	0.0	0.0	9.33

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

Date of last modification: 23.06.2022

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ BINFd/26	**Course name:** Bioinformatics for Doctoral Students

Course type, scope and the method:
Course type: Lecture / Practice / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 12s / 48s / 100s / 10s
Course method: present

Number of ECTS credits: 10

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

Course level: III.

Prerequisities:

Conditions for course completion:
The study is conducted in the form of lectures, seminars and consultations, practical activities on previously prepared assignments and in the form of self-study. Over the entire period of study, the doctoral student completes: 12 hours of lectures, 10 hours of seminars and consultations, 48 hours of practical activities and 100 hours of self-study. The subject is assessed individually according to the doctoral student's study plan and on the basis of the preparation of separate assignments on the issues of modern bioinformatics approaches and methods applied in biological research in connection with the topic of the dissertation. The subject assessment is standard and reflects the level of theoretical knowledge and practical skills in the issues of modern bioinformatics with a pass/fail assessment.

Learning outcomes:
By completing the course, students will gain knowledge in the field of advanced bioinformatics approaches and analytical methods applied in biological research, including the latest knowledge about molecular biological databases, acquisition of molecular data and, in particular, processing and presentation of data from analysis results using massively parallel sequencing (NGS, TGS). Students will gain knowledge in the issues of modern bioinformatics analyses with an emphasis on the focus of the dissertation project in accordance with the specifics of the topics of their dissertations. The course leads students to independent activity, including self-study and searching for relevant scientific information.

Brief outline of the course:
The subject Bioinformatics for doctoral students is part of the doctoral student's study activities and has a significantly individual character with regard to the focus of the dissertation topic. The basic syllabus of the subject is devoted to the following areas: Introduction to bioinformatics. Interconnection of biology, informatics and mathematics. Overview of modern applications (genomics, personalized medicine, biotechnology). Sequence data and their processing, Data formats (FASTA, FASTQ, SAM/BAM, VCF), Sequence alignment (pairwise, multiple alignment). Molecular databases (NCBI, UniProt, Ensembl). Bioinformatics tools and algorithms, BLAST, Clustal Omega, MAFFT, Markov models, motifs, profile methods. Phylogenetic analyses. Genomics and transcriptomics, Sequencing technologies (NGS, WGS, RNA-seq), pipelines for analyzing sequencing data, genome annotation. Ethics, reproducibility and data management, open

data and open-source tools, ethical issues of genomics and personalized medicine. Analysis of real biological data.

Recommended literature:

1. David W. Mount. Bioinformatics: Sequence and Genome Analysis. Cold Spring Harbor Laboratory Press, 2004, 665 pp. ISBN - 978-0879697129
2. Stuart M. Brown. Next-generation DNA sequencing informatics. Cold Spring Harbor Laboratory Press, ľnd Ed. 2015, 402 pp. ISBN - 978-1621821236
3. Vince Buffalo. Bioinformatics Data Skills: Reproducible and Robust Research with Open Source Tools. O'Reilly Media, 2015, 536 pp. ISBN - 978-1449367374

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: RNDr. Jana Kisková, PhD., doc. RNDr. Peter Pristaš, CSc., univerzitný profesor, RNDr. Linda Petijová, PhD.

Date of last modification: 05.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ BREHd/26	**Course name:** Biotechnology of Plants and Endophytic Fungi

Course type, scope and the method:
Course type: Lecture / Practice / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 30s / 30s / 50s / 10s
Course method: present

Number of ECTS credits: 7

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

Course level: III.

Prerequisities:

Conditions for course completion:
The study is carried out through lectures, laboratory practical activities, and self-study. Over the entire course of the programme, the student completes 30 hours of direct teaching, 30 hours of practical activities in laboratory, 10 hours of individual consultations, and 50 hours of self-study. The doctoral student is assessed on the basis of practical activities, and verification of the knowledge acquired through self-study of scientific literature by completing a semester paper related to the topic of the dissertation. Their knowledge is then further examined in an individual course examination. The assessment of the course is standard and reflects the student's sufficient orientation in the subject with a pass/fail mark.

Learning outcomes:
By completing the course, students will acquire knowledge in biotechnology of plants and their endophytic fungi, with an emphasis on topics related to the focus of the dissertation project. Students will gain the basic knowledge of plant and fungal biotechnology, extended by stable and transient transformation of various systems, determination of gene copy numbers and their expression using Real-Time PCR, and work with endophytic fungi from their isolation, cultivation, and identification to the study of biosynthetic gene clusters at the genomic, transcriptomic, and metabolomic levels. Special attention will be given to the use of databases across various OMICs levels, which will be applied in preparing a semester paper related to dissertation. The course also aims to promote self-study and independent search for scientific information.

Brief outline of the course:
The course Biotechnology of plants and endophytic fungi is a part of the doctoral student's study activities and has a partly individual character with regard to the specificity of the individual topics of the dissertation. The basic curriculum is determined as follows: Definition and history of biotechnology of plants and endophytic fungi. Aseptic techniques, culture conditions of plant explants and endophytes. Micropropagation, types of plant explant cultures used in plant biotechnology. Somatic hybridization and embryogenesis, direct and indirect organogenesis. Somaclonal varation. Secondary metabolites production, bioreactors, biotransformation, immobilization and elicitation. Genetic transformation, direct and indirect methods of transformation of plant explants, types of vectors, promotors, selection markers and reporter genes used in plant transformation, stable and transient transformation. Validation

of gene copy number using molecular techniques (Real-Time PCR). Germplasm storage, gene banks. Cryopreservation and slow growth method. Genetically modified organisms - metabolic engineering, genetic engineering, plants resistant to biotic and abiotic stresses, molecular farming, the role of tissue and organ specific plant promoters, plastome engineering, plant-based edible vaccines. RNA silencing, the application of microRNAs in plant biotechnology. Endophytic fungi, definition, and their isolation, culture and identification. Biotechnological applications of endophytic fungi, secondary metabolism and extracellular enzymes, biosynthetic gene clusters. Databases for the study of plants and endophytes at all OMICs levels.

Recommended literature:

1. Abdin M.Z., Kiran U., Kamaluddin M., Ali A. (eds.): Plant Biotechnology: Principles and Applications. 2017, Springer Nature Singapore Pte Ltd., Singapore, ISBN‍978-9811029615
2. Chawla H.S.: Introduction to Plant Biotechnology. 2009, third edition, Science Publisher, Enfield, USA, ISBN 1138407674
3. Abdel-Azeem A.M., Yadav A.N., Yadav N. (eds.): Endophytic Fungi: The Full Story of the Untapped Treasure (Developments in Applied Microbiology and Biotechnology). 2024, first edition, ‍Academic Press, USA, ISBN 0323993141
4. Periodicals and Internet sources

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: doc. RNDr. Katarína Bruňáková, PhD., RNDr. Miroslava Bálintová, PhD., RNDr. Jana Henzelyová, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ MEBSd/26	**Course name:** Cell metabolism seminar

Course type, scope and the method:
Course type: Lecture / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 10s / 100s / 10s
Course method: distance, present

Number of ECTS credits: 7

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

Course level: III.

Prerequisities:

Conditions for course completion:
The study takes place partly in the form of lectures and mainly by self-study. The evaluation of the course is carried out individually according to the doctoral student's study plan and on the basis of mastering the necessary amount of knowledge of cell metabolism in relation to the topic of the dissertation. The assessment of the course is standard and reflects the student's sufficient orientation in the subject with a pass/fail mark.

Learning outcomes:
By completing the course, students will acquire the necessary amount of knowledge of cell metabolism and sufficient orientation in the subject with emphasis on the focus of the dissertation project in accordance with the specifics of the individual topics. This knowledge represents an extension of the basic knowledge of energy and metabolic processes used to maintain homeostasis in animals and humans, acquired in the core course, with a focus on key molecules and processes occurring at the subcellular and molecular level. The course also aims to promote self-study and independent search for scientific information.

Brief outline of the course:
The course Seminar in Cell Metabolism is a part of the doctoral student's study activities and has a partly individual character with regard to the specificity of the individual topics of the dissertation. The basic curriculum is determined as follows: the role of glucose, fructose and galactose in the energy metabolism of the cell, possibilities of obtaining energy under anaerobic conditions. Regulation of glucose homeostasis, intracellular insulin signalling. Fatty acids, acylglycerols and their metabolism, specific features of white and brown adipose tissue cells. Acetyl-CoA, its formation and utilization, importance of ketone bodies in cell bioenergetics. ATP as an energy and signaling molecule. Phospholipids, sphingolipids and their functions. Cellular cholesterol metabolism and its regulation. Degradation and transformation of amino acids, amino nitrogen metabolism. Heme biosynthesis and degradation, iron metabolism. Prostaglandins, prostacyclins and thromboxanes, their synthesis and functions. Cytosolic production and role of reactive oxygen and nitrogen species, maintenance of redox homeostasis in cells. Compartmentation of metabolic processes in the cell.

Recommended literature:
Devlin T.M.: Textbook of Biochemistry with Clinical Correlations. Wiley-Liss 2006

Bhagavan N.V., Chung-Eun Ha: Essentials of Medical Biochemistry. Elsevier 2011
Newsholme E., Leech T.: Functional Biochemistry in Health and Disease. Wiley-Blackwell 2010

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: doc. RNDr. Monika Kassayová, CSc.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ SMEB/25	**Course name:** Cell metabolism seminar

Course type, scope and the method:
Course type: Lecture
Recommended course-load (hours):
Per week: Per study period: 10s
Course method: present

Number of ECTS credits: 6

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
The study takes place partly in the form of lectures and mainly by self-study. Throughout the course of study, the student will complete 10 hours of lectures, 10 hours of consultations, and 100 hours of self-study. The evaluation of the course is carried out individually according to the doctoral student's study plan and on the basis of mastering the necessary amount of knowledge of cell metabolism in relation to the topic of the dissertation. The assessment of the course is standard and reflects the student's sufficient orientation in the subject with a pass/fail mark.

Learning outcomes:
By completing the course, students will acquire the necessary amount of knowledge of cell metabolism and sufficient orientation in the subject with emphasis on the focus of the dissertation project in accordance with the specifics of the individual topics. This knowledge represents an extension of the basic knowledge of energy and metabolic processes used to maintain homeostasis in animals and humans, acquired in the core course, with a focus on key molecules and processes occurring at the subcellular and molecular level. The course also aims to promote self-study and independent search for scientific information.

Brief outline of the course:
The course Seminar in Cell Metabolism is a part of the doctoral student's study activities and has a partly individual character with regard to the specificity of the individual topics of the dissertation. The basic curriculum is determined as follows: the role of glucose, fructose and galactose in the energy metabolism of the cell, possibilities of obtaining energy under anaerobic conditions. Regulation of glucose homeostasis, intracellular insulin signalling. Fatty acids, acylglycerols and their metabolism, specific features of white and brown adipose tissue cells. Acetyl-CoA, its formation and utilization, importance of ketone bodies in cell bioenergetics. ATP as an energy and signaling molecule. Phospholipids, sphingolipids and their functions. Cellular cholesterol metabolism and its regulation. Degradation and transformation of amino acids, amino nitrogen metabolism. Heme biosynthesis and degradation, iron metabolism. Prostaglandins, prostacyclins and thromboxanes, their synthesis and functions. Cytosolic production and role of reactive oxygen and nitrogen species, maintenance of redox homeostasis in cells. Compartmentation of metabolic processes in the cell.

Recommended literature:

Devlin T.M.: Textbook of Biochemistry with Clinical Correlations. Wiley-Liss 2006
Bhagavan N.V., Chung-Eun Ha: Essentials of Medical Biochemistry. Elsevier 2011
Newsholme E., Leech T.: Functional Biochemistry in Health and Disease. Wiley-Blackwell 2010

Course language:
English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: doc. RNDr. Monika Kassayová, CSc.

Date of last modification: 03.09.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.	

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.	

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. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

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

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

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

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

Course language:

Notes:

Course assessment
Total number of assessed students: 1803

A	B	C	D	E	FX	N	P
24.96	14.86	16.14	14.42	17.75	11.09	0.0	0.78

Provides: doc. RNDr. Katarína Bruňáková, PhD., RNDr. Miroslava Bálintová, PhD., RNDr. Jana Henzelyová, PhD.
Date of last modification: 23.02.2026
Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ CTP1/01	**Course name:** Cytopathology
Course type, scope and the method: **Course type:** Lecture **Recommended course-load (hours):** **Per week:** 2 **Per study period:** 28 **Course method:** present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course:	
Course level: II., III.	
Prerequisities:	
Conditions for course completion: Oral examination	
Learning outcomes: To provide the students with a knowledge of basic biological principles of carcinogenesis.	
Brief outline of the course: Tumor development. Tumor growth and metastatic potential. Cell cycle regulation and pathogenesis of cancer. Apoptosis in tumor growth and metastasis. Oncogenes and cancer. Tumor suppressor genes. Metastasis suppressor genes. Angiogenesis in cancer. Cell surface glycoproteins and their receptors. Proteinases and their inhibitors in cancer invasion. Radio-, chemo- and immunotherapy.	
Recommended literature: L. Pecorino: Molecular Biology of Cancer. Mechanisms, Targets, and Therapeutics. Fifth Edition, Oxford University Press, 2021 Robert A. Meyers: Cancer, From Mechanisms to Therapeutic Approaches, Wiley-VCH Verlag GmbH & Co. KGaA, 2007, ISBN 978-3-527-31768-4 Robert G. McKinnell et al.: The Biological Basis of Cancers, Second Edition, Cambridge University Press, 2006, ISBN 13: 978-0-521-84458-1 Vincent T. DeVita, Jr, et al.: Cancer Principles & Practice of Oncology, 3rd Edition, Wolters Kluwer/Lippincott Williams & Wilkins, 2012, ISBN 13: 978-1-4511-1639-7 John D. Schuetz and Toshihisa Ishikawa: Adcances in Cancer Research ABC Transporters and Cancer, Elsevier/Academic Press 2015, ISBN 978-0-12-801251-2 Roberto Scatena et al.: Advances in Cancer Stem Cell Biology, Springer, 2012, ISBN 978-1-4614-0808-6, DOI 10.1007/978-1-4614-0809-3	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 389

A	B	C	D	E	FX	N	P
38.82	22.11	22.62	8.23	4.88	1.8	0.0	1.54

Provides: prof. RNDr. Peter Fedoročko, CSc., doc. RNDr. Rastislav Jendželovský, PhD., RNDr. Jana Vargová, PhD.

Date of last modification: 13.02.2024

Approved: prof. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

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

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

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

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

Course language:

Notes:

Course assessment
Total number of assessed students: 109

A	B	C	D	E	FX	N	P
65.14	14.68	0.92	0.0	1.83	0.92	0.0	16.51

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

Date of last modification: 23.06.2022
Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

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

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

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

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

Course language:
English

Notes:

Course assessment
Total number of assessed students: 180

A	B	C	D	E	FX	N	P
18.33	27.22	26.67	11.67	12.78	1.11	0.0	2.22

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

Date of last modification: 04.02.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/GMd/12	**Course name:** Gene manipulations

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

Number of ECTS credits: 6

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

Conditions for course completion:
Independent elaboration of a poster on a topic related to the subject. Completion of exercises
Oral examination

Learning outcomes:
Obtaining knowledge about cloning and gene expression in various host systems, their use in biotechnological and biological research. Acquisition of knowledge about more complex and latest genetic methods and procedures and their use in solving specific biological problems.

Brief outline of the course:
Cloning and expression of genes in yeast and animal cells. In vitro amplification techniques for DNA and RNA molecules. In vitro mutagenesis. Biotechnology and genetic engineering. Preparation of biologically active substances and recombinant vaccines.

Recommended literature:
BROWN, Terence A. Gene cloning and DNA analysis: an introduction. Wiley-blackwell, 2020.
DALE, Jeremy W.; VON SCHANTZ, Malcolm; PLANT, Nicholas. From Genes to Genomes: Concepts and Applications of DNA Technology. John Wiley & Sons, 2011.
HOWE, Christopher. Gene cloning and manipulation. Cambridge University Press, 2007.

Course language:
English

Notes:

Course assessment
Total number of assessed students: 11

abs	n
100.0	0.0

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

Date of last modification: 23.06.2022

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ GER/22	**Course name:** Genetic and epigenetic regulation of gene expression
Course type, scope and the method: **Course type:** Lecture / Practice **Recommended course-load (hours):** **Per week:** 2 / 0 **Per study period:** 28 / 0 **Course method:** present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion: Understanding of genetic and epigenetic regulation of gene expression based on recent findings and achievements.	
Learning outcomes: To understand basic differences between genetic and epigenetic regulation of gene expression, to apprehend the fundamentals of regulation in different organisms as revealed by genetic model systems, to become acquainted with future objectives and results of human genome and human epigenome analyses along with other projects as ENCODE or HMP.	
Brief outline of the course: Regulation systems in microorganisms: global regulation, regulation at the transcription level, signal transduction, regulation by ncRNA, feed-back regulation, posttranslational regulation. Eukaryotic regulation systems. Levels of genetic control. Pre-transcriptional and transcriptional levels. Histone modifications, chromatin remodeling. Cis-regulation elements and their interactions with regulation proteins. Project ENCODE (Encyclopedia of DNA elements). Posttranscriptional level. Alternative splicing. Stability and degradation of mRNA. Multipurpose role of ncRNA in posttranscriptional regulation. Epigenetic regulation. DNA methylation and methylome. Methods of analysis of the methylation status. The role of short and long ncRNAs in epigenetic regulation. Epigenetics and monoallelic gene expression. Epigenetic regulation of cancerogenesis. Epigenomic projects. Methods of genome analysis. "OMICS" approaches. CRISPR-Cas and genome editing.	
Recommended literature: Madigan, M. T.: Microorganisms. 16th edition. Pearson Education Lt. 2022, 1123 pp. Klug, W. S.: Concepts of Genetics. 12th edition. Pearson Education Lt. 2020, 862 pp.	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 1

abs	n
100.0	0.0

Provides: doc. RNDr. Peter Pristaš, CSc., univerzitný profesor, RNDr. Zuzana Jendželovská, PhD., doc. RNDr. Katarína Bruňáková, PhD.

Date of last modification: 24.11.2021

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ GMO/22	**Course name:** Genetically modified organisms

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

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Understanding of the fundamentals of genetic modification, its significance and practical use.

Learning outcomes:
Understanding of the fundamentals and basic principles and significance of genetic modification of organisms and their use in biotechnology.

Brief outline of the course:
Traditional and modern genetic modification. Genetic modification in research. Genetic modification as a tool for study of gene function. Practical aspects of genetically modified organisms. Microorganisms and production of human proteins (Humulin produced by E. coli as an example). Vaccines based on GMO (covid vaccines as an example). Genetic modification of plants (examples of GM tomato FlavrSavr - the first example of anti-sense RNA techniques, golden rice - modification of biosynthetic pathway of carotenoids, genetic modification of cpDNA aimed at production of vaccines and medicines for treatment of metabolic and genetic diseases). Genetically modified animals (goat milk containing human antitrombin as an example). Social and ethical aspects of GMO.

Recommended literature:
Klug, W. S.: Concepts of Genetics. 12th edition. Pearson Education Lt. 2020, 862 pp.
Scientific papers

Course language:

Notes:

Course assessment
Total number of assessed students: 4

abs	n
100.0	0.0

Provides: doc. RNDr. Katarína Bruňáková, PhD.

Date of last modification: 24.11.2021

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ GC1/01	**Course name:** Human Genetics

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

Number of ECTS credits: 5

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

Conditions for course completion:
Full-time form of experimental and practical teaching: active participation in practicals, written and oral exam. In case of distance learning: active participation in practicals (the online method) using the MOODLE course UBEV/Human Genetics, written exam.

Learning outcomes:
To provide students with a basics of human genetics, with the role of genetic factors in pathologic processes, with the inheritance, diagnostics and treatment of genetic disorders.

Brief outline of the course:
The genetic basics of physiological variability and pathological traits of individuals; human population genetics; immunological variability; the patterns of inheritance and pedigree problem solving; the basic methods used in human genetics - genealogy, linkage analysis and the gene mapping, cytogenetic analysis and karyotyping, the DNA diagnosis of pathological traits; the treatment of genetic disorders.

Recommended literature:
Friedman JM, Dill FJ, Hayden MR, McGillivray BC (1996): Genetics 2/e. Williams & Wilkins, Baltimore, Maryland, USA
Lewis R.: Human Genetics: Concepts and Applications, 9th Edition. McGraw-Hill, New York, 2010
Passarge E.: Genetics, 3rd Edition, Thieme, 2007

Course language:
slovak and english

Notes:

Course assessment
Total number of assessed students: 1705

A	B	C	D	E	FX	N	P
24.16	15.19	17.01	14.37	17.71	11.14	0.0	0.41

Provides: doc. RNDr. Katarína Bruňáková, PhD.

Date of last modification: 26.11.2021
Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 3

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:
During the semester, the student will study immunology related to his/her PhD thesis.

Learning outcomes:
To provide the students with knowledge on immunological mechanisms at cell and organism levels

Brief outline of the course:
Cells and tissues of the immune system. Cooperation between T, B and antigen presenting cells. Non-specific lymphocytic stimulation. Innate immunity. Antigen recognition by lymphocytes. Cell receptors. Immune response. The major histocompatibility complex. The adaptive immune response. T-cells mediated immunity. The humoral immune response. Hypersensitivity. Transplantation immunology. The immune system in health and disease.

Recommended literature:
Keneth Murphy: Janeway's Immunobiology 2017, research papers related to the topics

Course language:

Notes:

Course assessment
Total number of assessed students: 1010

A	B	C	D	E	FX	N	P
39.31	24.36	23.76	6.83	2.08	3.56	0.0	0.1

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

Date of last modification: 23.11.2021

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ IMDd/26	**Course name:** Immunology for PhD Students

Course type, scope and the method:
Course type: Lecture / Practice / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 15s / 30s / 70s / 15s
Course method: distance, present

Number of ECTS credits: 8

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

Course level: III.

Prerequisities:

Conditions for course completion:
• continuous study of scientific literature relevant to the dissertation topic
• preparation of a scholarly text (10–15 pages) focused on an immunological problem in the context of the PhD project
• presentation of the processed topic
• successful completion of an oral examination aimed at evaluating the understanding of general and applied immunology in the context of the doctoral research

Learning outcomes:
Knowledge:
• acquisition of advanced knowledge in molecular, cellular, and systems immunology,
• understanding of regulatory mechanisms, immunometabolism, and immune system interactions,
• development of an in-depth overview of immunological processes relevant to the PhD topic.
Skills:
• ability to analyse and interpret immunological mechanisms in experimental settings,
• ability to evaluate current scientific literature and formulate immunology-oriented hypotheses,
• competence in applying immunological principles within biomedical research.
Competences:
• ability to independently address immunology-related research tasks,
• ability to present scientific results and defend conclusions,
• ability to integrate immunological knowledge into the context of the PhD thesis research.

Brief outline of the course:
Integrated mechanisms of innate and adaptive immunity; immunoregulatory processes; cytokine signaling pathways; complement; immunometabolism; intestinal and mucosal immunity (GALT); the role of the gut microbiome in modulating innate and adaptive immune responses; host–microbe interactions; the significance of microbial metabolites (SCFA, tryptophan derivatives, secondary bile acids) in regulating inflammation and homeostasis; the gut–brain–immune axis; dysbiosis and mucosal inflammation; immune processes in chronic diseases; experimental models for studying immune responses (in vitro, in vivo); advanced immunological methods and immunological data analysis, including PhD student presentations and expert discussion.

Recommended literature:

• Murphy et al.: Janeway’s Immunobiology (2022)
• Abbas, Lichtman: Cellular and Molecular Immunology (2022)
• Goel, Requena, Bansal: Human-gut microbiome (2023)
• Faris Q. Alenzi: Animal Models in Experimental Medicine (2024)
• Current scientific papers from PubMed and Scopus databases

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

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

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ UFCM/10	**Course name:** Introduction to Flow Cytometry

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

Number of ECTS credits: 4

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

Conditions for course completion:

Learning outcomes:
The goal is to teach the students on II. stage some theoretical and practical aspects of flow cytometry. The course will cover theoretical bases of fluorescence, its detection, multiparametric analyses and practical applications in clinical diagnosis and scientific research.

Brief outline of the course:
1.) Conditions for completing the course, completing training in health and safety regulations. 2.) Fluorescence, types of fluorescent devices, flow cytometer. 3.) Principle of flow cytometry, data presentation, gating strategy. 4.) Particles size in flow cytometry, flow cytometry in cell biology, zoology and microbiology. 5.) Cell sorting. 6.) Cell cycle analysis. 7.) Detection of phosphatidylserine translocation and viability. 8.) Compensation, spectraviewer. 9.) Analysis of mitochondrial membrane potential and activation of caspases. 10.) Detection of stem cells. 11.) Immunophenotyping. 12.) Flow cytometry in botany. 13.) DNA content and genome size. Data evaluation strategies, FlowJo software.

Recommended literature:
1. H.M. Shapiro: Practical Flow Cytometry, WILEY-LISS, 2003. (ISBN:0-471-41125-6)
2. A.L. Givan: Flow Cytomtery: First principles, WILEY-LISS, 2001, (ISBN 0-471-22394-8)
3. J. Dolezel a kol.: Flow Cytometry with Plant Cells, Willey-VCH, 2007, (ISBN: 978-3-527-31487-4)

Course language:

Notes:

Course assessment
Total number of assessed students: 216

A	B	C	D	E	FX	N	P
62.96	10.19	6.48	1.85	1.39	0.0	0.0	17.13

Provides: doc. RNDr. Rastislav Jendželovský, PhD., RNDr. Viktória Dečmanová, PhD., doc. Mgr. Vladislav Kolarčik, PhD.

Date of last modification: 19.02.2024
Approved: prof. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ MOG/03	**Course name:** Model Organisms in Genetics
Course type, scope and the method: **Course type:** Lecture / Practice **Recommended course-load (hours):** **Per week:** 2 / 2 **Per study period:** 28 / 28 **Course method:** present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: II., III.	
Prerequisities:	
Conditions for course completion: protocols, preparation of a project: Model organism for my diploma thesis, oral examination	
Learning outcomes: To provide the students with genetic models of prokaryotic and eukaryotic organisms used in genetic research.	
Brief outline of the course: Basic properties of model organisms used in genetics. Viral models in genetics (Tobacco mosaic virus, Lambda phage, PhiX174 phage, corona viruses). Prokaryotic model systems (Escherichia coli, Diplococcus pneumoniae, Agrobacterium tumefaciens and A. rhizogenes). Another prokaryotic models (Bacillus subtilis, Caulobacter crescentus, Mycoplasma genitalium, Synechocystis sp.), model systems of simple eukaryotic organisms (Saccharomyces cerevisiae, Neurospora crassa, Aspergillus nidulans, Dictiostelium discoideum). Animal model systems (Drosophila melanogaster, Caenorhabditis elegans, Danio rerio, Mus musculus). Another animal models (Xenopus laevis, Ambystoma mexicanum, Chrysemys picta, Anolis carolinensis, Fugu rubripes, Gallus gallus, Heterocephalus glaber). Plant model organisms (Pisum sativum, Arabidopsis thaliana, Nicotiana tabacum, Zea mays, Selaginella moellendorffii, Brachypodium distachyon, Lotus japonicus, Populus trichocarpa). Genetic databases. Model organisms and their importance in the study of fundamentals of human genetic disorders.	
Recommended literature: Snustad, P.D., Simmons, M.J.: Genetika. Nakladatelství Masarykovy univerzity, Brno, 2009, 871 pp., 2017, 864 pp. Periodicals in the field of genetics, Internet sources	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 1785

A	B	C	D	E	FX	N	P
23.81	15.35	16.47	14.29	18.15	11.15	0.0	0.78

Provides: RNDr. Martina Matoušková, PhD., RNDr. Jana Henzelyová, PhD.

Date of last modification: 26.07.2021

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ MOGd/26	**Course name:** Model Organisms in Genetics and Molecular Biology

Course type, scope and the method:
Course type: Lecture / Practice / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 30s / 30s / 50s / 10s
Course method: present

Number of ECTS credits: 7

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

Course level: III.

Prerequisities:

Conditions for course completion:
The study takes place in the form of lectures, practical activities and by self-study. Throughout the course of study, the student will complete 30 hours of lectures, 30 hours of practical activities, 10 hours of consultations, and 50 hours of self-study. The doctoral student is evaluated based on their proficiency in practical tasks and the verification of knowledge acquired through independent study of literature, the mastery of which will be verified by a short presentation showcasing the potential use of the model organism(s) in experiments related to the dissertation topic. The evaluation of the course is carried out through the preparation of reports and the study of scientific literature, culminating in a presentation on a model organism related to the dissertation topic and an oral exam. The assessment of the course is standard and reflects the student's sufficient orientation in the subject with a pass/fail mark.

Learning outcomes:
By completing the course, students gain general knowledge of the latest state of art involving model biological systems and their use in testing scientific hypotheses. The aim of the course is to provide students with sufficient information to familiarise themselves in the subject matter, with an emphasis on their dissertation project. The knowledge represents an extension of the fundamental understanding of model organisms used in genetics and molecular biology acquired in the basic course. A successful graduate of the course is capable to independently process information on the use of model organisms and apply it to a specific biological system used to achieve the aims of the dissertation. The student is able to search for relevant information in literature to solve specific problems in the studied scientific field.

Brief outline of the course:
The course Model Organisms in Genetics and Molecular Biology is part of the doctoral student's study activities and has a partially individual character considering the specificity of the dissertation topics. The basic outline is defined as follows:
Basic properties of model organisms used in genetics. Viral models in genetics (obacco mosaic virus, cauliflower mosaic virus, bacteriophage Lambda, PhiX174, SV40, influenza viruses, and coronaviruses). Prokaryotic model systems (Escherichia coli, Streptococcus pneumoniae, Rhizobium radiobacter). Other prokaryotic models (Bacillus subtilis, Caulobacter crescentus, Mycoplasma genitalium, Synechocystis sp.), model systems of simple eukaryotic organisms

(Saccharomyces cerevisiae, Schizosaccharomyces pombe, Komagataella phaffii, Yarrowia lipolytica, Dictiostelium discoideum). Models of fillamentous fungi (Aspergillus nidulans, Neurospora crassa). Animal model systems (Drosophila melanogaster, Caenorhabditis elegans, Danio rerio, Mus musculus, Rattus norvegicus). Other animal models (Xenopus laevis, Ambystoma mexicanum, Chrysemys picta, Anolis carolinensis, Fugu rubripes, Gallus gallus, Heterocephalus glaber). Plant model organisms (Arabidopsis thaliana, Nicotiana tabacum, Zea mays, Selaginella moellendorffii, Brachypodium distachyon, Lotus japonicus, Populus trichocarpa). Humas as a model organism, cancer cell lines. Model organisms and their importance in the study of fundamentals of human genetic disorders. Genetic databases.

Recommended literature:

1. Snustad, P.D., Simmons, M.J.: Genetika. Nakladatelství Masarykovy univerzity, Brno, 2009, ISBN: 9788021048522, 871 str., 2017, ISBN: 9788021086135, 864 str.
2. Davis, H.D.: The Microbial Models of Molecular Biology: From Genes to Genomes. Oxford University Press, 2003, ISBN-10: ‍0195154363, ISBN-13: ‍978-0195154368, 337 str.
3. Periodicals in the field of genetics and molecular biology
4. Internet sources

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: RNDr. Jana Henzelyová, PhD., RNDr. Martina Matoušková, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ MMMVd/26	**Course name:** Modern Methods in Microbiological Research

Course type, scope and the method:
Course type: Lecture / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 12s / 58s / 30s
Course method: present

Number of ECTS credits: 6

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

Course level: III.

Prerequisities:

Conditions for course completion:
The study is conducted in the form of lectures, consultations and self-study. Over the entire period of study, the doctoral student completes: 12 hours of lectures, 30 hours of consultations and 58 hours of self-study. The subject is assessed individually according to the doctoral student's study plan based on the level of knowledge and understanding of modern molecular methods applied in modern microbiological research in connection with the topic of the dissertation. The subject assessment is standard and reflects the level of theoretical knowledge and practical skills in the issues of modern molecular microbiology with a pass/fail assessment.

Learning outcomes:
By completing the course, students will gain knowledge in the field of advanced molecular approaches and analytical methods applied in modern microbiological research, including the latest knowledge on the application of molecular -omic approaches (genomics, metagenomics, proteomics). Students will gain knowledge in the issues of modern microbiological approaches with an emphasis on the focus of the dissertation project in accordance with the specifics of the topics of their dissertations. The course leads students to independent activity, including self-study and searching for relevant scientific information.

Brief outline of the course:
The subject Modern Methods in Microbiological Research is part of the doctoral student's study activities and has a significantly individual character with regard to the focus of the dissertation topic. The basic syllabus of the subject is devoted to the following areas: Introduction to modern microbiological methods, overview of traditional vs. modern approaches, importance of molecular and genomic techniques in current research. Fluorescence microscopy, confocal microscopy, electron microscopy (SEM, TEM). Culture-independent methods, metagenomics and analysis of microbial communities, amplicon sequencing (16S/18S rRNA, ITS), metatranscriptomics, metaproteomics, PCR, qPCR, digital droplet PCR. Cloning, gene expression, mutagenesis. Genomic and bioinformatics methods, whole genome sequencing, genome assembly, annotation, comparative genomics. Phylogenetic analyses and databases. Mass spectrometry, proteomic mapping and quantification, metabolomic profiling of microorganisms. Microbial ecology, biofilms. Application of modern methods, environmental microbiology, industrial microbiology.

Bioethics and regulatory frameworks, ethical and safety aspects, work with GMOs and pathogens. Open science and reproducibility.

Recommended literature:

1. Stéphane Uroz, Francis Martin, et al. Microbial Environmental Genomics. Methods in Molecular Biology series. Humana 2023, 380 pp. ISBN - 978-1071628737
2. Jacques Izard, Maria Rivera. Metagenomics for Microbiology (2nd Edition). Elsevier 2024. 308 pp. ISBN - 9780443223761
3. Randall T. Hayden, Karen C. Carroll, John P. Dekker, et al. Manual of Molecular Microbiology: Fundamentals and Applications. ASM Press 2025, 514 pp. ISBN - 978-1683674580
4. Wendy Snyder, Larry, Champness. Molecular Genetics of Bacteria. American Society for Microbiology, 1997, 526 pp. ISBN - 978-1555811020

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: doc. RNDr. Peter Pristaš, CSc., univerzitný profesor, RNDr. Jana Kisková, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ MZKd/26	**Course name:** Molecular Basis of Carcinogenesis

Course type, scope and the method:
Course type: Lecture / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 10s / 100s / 10s
Course method: present

Number of ECTS credits: 7

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

Course level: III.

Prerequisities:

Conditions for course completion:
The study is conducted partly through lectures and mostly through self-study. During the entire study period, the student completes 10 hours of lectures, 10 hours of consultations, and 100 hours of self-study. Assessment is carried out individually according to the doctoral student's study plan and based on mastering the required knowledge of the molecular basis of carcinogenesis in relation to the dissertation topic. The grading is standard (passed/failed) and reflects sufficient orientation in the given field.

Learning outcomes:
By completing the course, students acquire the necessary knowledge of the molecular basis of carcinogenesis and sufficient orientation in the subject matter, with emphasis on the focus of the dissertation project in accordance with the specifics of individual topics. This knowledge represents an extension of basic information about the conversion of a normal cell into a tumor cell, genetic and epigenetic factors influencing this process, and the molecular basis of tumor development obtained in the basic master-level course (Cytopathology). The course also aims to support self-study and independent search for scientific information.

Brief outline of the course:
The course Molecular Basis of Carcinogenesis is part of the doctoral student's study activities and has a partially individual character considering the specificity of individual dissertation topics. The basic outline includes: Development and progression of cancer (phases of carcinogenesis, genetic and epigenetic factors, tumor types), differences between normal and transformed cells. General properties of tumor cells, proliferative changes, pseudotumors, theory of carcinogenesis. Chemical and physical carcinogens, environmental factors in carcinogenesis, radiation – non-ionizing and ionizing, chemical carcinogens – polycyclic aromatic hydrocarbons, peroxisome proliferators, xenobiotic lipids, chlorinated pesticides, carcinogens and cocarcinogens, anticarcinogens. Molecular basis of cancer development and progression, genetic mechanisms, mutation and mutagens, tumor-promoting factors (exogenous and endogenous), proto-oncogenes and oncogenes, classification of proto-oncogenes, activation of proto-oncogenes. Oncogenes encoding growth factors and growth factor receptors, oncogenes encoding Ras proteins, non-receptor protein kinases and transcription factors. Tumor suppressor genes RB, TP53, interaction of Rb protein with transcription factor E2F, biological function of p53 and p21, mechanism

of TP53 gene expression, inactivation of p53 protein, relationships between proteins p53, p21, and pRb, other tumor suppressor genes. Viruses as inductive agents of carcinogenesis, biology of oncogenic viruses, oncoproteins, biology of RNA genome viruses, insertional mutagenesis, transduction by acutely transforming retroviruses. Metastasis: steps of the metastatic process (invasion, intravasation, circulation, extravasation, and metastatic colonization). Micrometastases. Angiogenesis, non-angiogenic tumor growth, angiogenic tumor growth, tumor vasculature, angiogenic factors associated with tumors. Importance of oxidative metabolism, formation of reactive oxygen species in living systems, positive and toxic effects of reactive oxygen species, antioxidant systems, reactive oxygen species in initiation of carcinogenesis and tumor progression. Multidrug resistance, mechanisms of multidrug resistance, xenobiotic metabolism by cytochrome P450 monooxygenases, xenobiotic efflux by ABC transport proteins, ABC transport proteins and therapy. Prevention, diagnosis, and treatment of cancer, experimental, epidemiological, and clinical studies, population screening, biological diagnostic markers, genetic predisposition, therapies – surgery, radiation, chemotherapy, immunotherapy.

Recommended literature:

1. L. Pecorino: Molecular Biology of Cancer. Mechanisms, Targets, and Therapeutics. Fifth Edition, Oxford University Press, 2021
2. B. Alberts et al.: Molecular Biology of the Cell, 4th edition, Garland Science, New York 2002
3. B. Alberts et al.: Czech edition – Fundamentals of Cell Biology, Espero Publishing, Ústí n./ Labem 1998
A. Rejthar, B. Vojtěšek: General Pathology of Tumor Growth, GRADA Publishing, 2002
4. S. Štípek et al.: Antioxidants and Free Radicals in Health and Disease, GRADA Publishing, 2000
5. V. Hořejší, J. Bartůňková: Fundamentals of Immunology, 2nd edition, Triton, Prague 2002
6. What you need to know about cancer, Scientific American – Special Issue, September 1996 – entire issue

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: prof. RNDr. Peter Fedoročko, CSc., doc. RNDr. Rastislav Jendželovský, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ MOBd/26	**Course name:** Molecular Biology for Doctoral Students

Course type, scope and the method:
Course type: Lecture / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 10s / 100s / 25s
Course method: present

Number of ECTS credits: 8

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

Course level: III.

Prerequisities:

Conditions for course completion:
The study takes place partly in the form of lectures and mainly through self-study. During the entire study period, the student completes 10 hours of direct teaching (introductory lecture block), 25 hours of consultations (consultation block according to the focus of the doctoral dissertation), and 100 hours of self-study. Course evaluation is individualized according to the doctoral student's study plan and based on mastering the necessary knowledge of molecular and cellular functions, including gene expression regulation, cell signaling, cell cycle, and the role of selected proteins in relation to the dissertation topic. The assessment is standard and indicates sufficient orientation in the subject with a pass/fail mark.

Learning outcomes:
By completing the course, students will consolidate their knowledge of molecular cell biology and gain a detailed overview of molecular and cellular functions, including gene expression regulation, cell signaling, cell cycle, and the role of selected proteins. They will acquire sufficient orientation in the subject with emphasis on the dissertation project in accordance with the specifics of individual topics. The course also aims to promote self-study and independent search for scientific information.

Brief outline of the course:
The course Molecular Biology for Doctoral Students is part of the doctoral student's study activities and has a partly individual character due to the specificity of dissertation topics. Students will gain the latest knowledge on genome organization, analysis, and experimental manipulation in the study and treatment of diseases, including applications of current methods in DNA technology, DNA sequencing, transcriptome and proteome analysis at individual and global levels; manipulation of gene expression in vitro and in vivo, epigenetics, non-coding RNAs, gene therapy, and how modern molecular methods are used to address problems in molecular biology, biomedical sciences, and biotechnology. After completing the introductory block focused on general knowledge of molecular cell biology, the student selects one block according to the focus of their dissertation:
1. Molecular Biology of the Prokaryotic Cell
2. Molecular Biology of the Cancer Cell
3. Molecular Biology of the Eukaryotic Cell
4. Molecular Biology of the Nerve Cell

Recommended literature:
1. Lodish, H.: Molecular Cell Biology, 9th Ed., W.H. Freeman, 2021, 1264 pp., ISBN-13: 9781319208523
2. Cullis, C. A.: Plant Genomics, John Wiley & Sons, 2025, ISBN-10: 1394211554

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: doc. RNDr. Peter Pristaš, CSc., univerzitný profesor, prof. RNDr. Peter Fedoročko, CSc., doc. RNDr. Rastislav Jendželovský, PhD., doc. RNDr. Katarína Bruňáková, PhD., RNDr. Linda Petijová, PhD., doc. RNDr. Zuzana Daxnerová, CSc., RNDr. Anna Alexovič Matiašová, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ MMOCd/26	**Course name:** Molecular Mechanisms in Mammalian Ontogenesis

Course type, scope and the method:
Course type: Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 100s / 20s
Course method: present

Number of ECTS credits: 7

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

Course level: III.

Prerequisities:

Conditions for course completion:
The course is carried out predominantly through self-study, complemented by 20 hours of consultations with the course teacher. The evaluation of the course is carried out individually, in accordance with the doctoral student's study plan, and is based on the demonstration of knowledge of the molecular mechanisms of mammalian ontogenetic development in relation to the topic of the dissertation thesis. The assessment of the course is standard and reflects an adequate understanding of the subject matter, with a pass/fail evaluation.

Learning outcomes:
By completing this course, students will acquire essential knowledge of mammalian ontogenetic development and sufficient orientation in topics relevant to the thematic focus of their dissertation thesis. These competencies deepen their understanding of the molecular, regulatory, and signalling mechanisms responsible for controlling and directing key processes occurring during embryonic and postnatal development of mammals and humans. Students will also understand mechanisms whose dysregulation may lead to pathological changes and manifestations. The course further aims to support self-study and independent search for scientific information.

Brief outline of the course:
The course Molecular Mechanisms in Mammalian Ontogenesis is part of the doctoral student's study activities and has a partly individualized character due to the specificity of dissertation topics. The basic outline is defined as follows: Mammalian gametogenesis, molecular basis and regulation of spermatogenesis and oogenesis. Fertilization and early embryonic development, blastulation, regulation of early embryogenesis and embryo polarization. Gastrulation, induction of the primitive streak and germ layers, determination of the embryonic axes. Neurulation, specification and development of the nervous system. Somitogenesis, myogenesis, and embryonic body elongation. Organogenesis (regulation of the development of sensory organs and epidermis; cardiovascular system; excretory system and reproductive organs; axial skeleton and limbs; digestive and respiratory systems). Regeneration, aging, and senescence. Developmental defects, genetic developmental disorders, teratogens, endocrine causes of developmental defects and abnormalities. Cancer as a developmental disease.

Recommended literature:

1. Gilbert S.F., Barresi M.J.F.: Developmental Biology (11th edition), Sinauer Associates (Oxford University Press), 2016
2. Carlson, B.M.: Human Embryology & Developmental Biology (6th edition), Elsevier, 2019

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: doc. RNDr. Zuzana Daxnerová, CSc., RNDr. Zuzana Jendželovská, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ MMOC/22	**Course name:** Molecular Mechanisms of Mammalian Ontogenesis

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 2 / 0 **Per study period:** 28 / 0
Course method: present

Number of ECTS credits: 3

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Participation in a lectures and passing an exam.

Learning outcomes:
Students will acquire basic knowledge about ontogenetic development in mammals and about developmental molecular and regulatory mechanisms taking part in gametogenesis, fertilization, early embryogenesis (morulation, blastulation, gastrulation) and organogenesis.

Brief outline of the course:
1. Gametogenesis in mammals. Molecular basis and regulation of spermatogenesis and oogenesis.
2. Fertilization and early embryogenesis. Blastulation. Regulation of early embryonic development and polarization of early embryo.
3. Gastrulation. Induction of primitive streak and germ layers. Determination of body axes.
4. Neurulation. Specification and development of nervous system.
5. Somitogenesis, myogenesis and body extension.
6. Organogenesis. Development of sensory organs and epidermis.
7. Organogenesis. Development of cardiovascular system.
8. Organogenesis. Development of urogenital system.
9. Organogenesis. Development of skeletal system and limbs.
10. Organogenesis. Development of digestive and respiratory system.
11. Regeneration, aging and senescence.
12. Developmental deffects and disorders. Genetic errors in development, teratogens, endocrine disruptors.
13. Cancer as a disease of development.

Recommended literature:
Scott F. Gilbert, Michael J.F. Barresi (2016): „Developmental Biology“ (11th edition; Sinauer Associates, Inc.)

Course language:
english

Notes:

Course assessment Total number of assessed students: 2	
N	P
0.0	100.0
Provides: RNDr. Zuzana Jendželovská, PhD.	
Date of last modification: 10.09.2021	
Approved: prof. RNDr. Peter Fedoročko, CSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/MCYT/22	**Course name:** Molecular cytology

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: 4

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

Course level: III.

Prerequisities:

Conditions for course completion:
100% participation. Written examination.

Learning outcomes:
To get acquainted of students with molecular level of key processes taking place in the eukaryotic cell.

Brief outline of the course:
1.) Methods applied in molecular cytology. 2.) Organisation at the level of supramolecular complexes, cell structures and cells. 3.) Composition, structure and organisation of biological membranes. 4.) Cell cycle. 5.) Cell division. 6.) Mechanisms of substance transfer across membranes. 7.) Transport of substances into cells. 8.) Metabolism of substances. 9.) Transport of substances from cells. 10.) ABC transport proteins. 11.) Exosomes. 12.) Antioxidant systems of cells. 13.) Stress proteins of cells. Signaling pathways involved in cell survival. Signaling pathways leading to programmed cell death.

Recommended literature:
Wilson J. and Hunt T. Molecular Biology of The Cell: a problems approach, fourth edition, Garland Science, 2002
Campbell N. a Reece J.: Biologie. Computer Press, 2006
Karp G.: Cell Biology, sixth edition, John Wiley and Sons, 2010

Course language:
slovak, english

Notes:

Course assessment
Total number of assessed students: 8

N	P
0.0	100.0

Provides: doc. RNDr. Rastislav Jendželovský, PhD.

Date of last modification: 19.02.2024

Approved: prof. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/FARM/09	**Course name:** Pharmacology

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: 8

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

Course level: III.

Prerequisities:

Conditions for course completion:

Learning outcomes:
To provide students with a comprehensive introduction to the fundamental Pharmacology and uses of the major classes of drugs currently used in medical practice.

Brief outline of the course:
Basic pharmacology (pharmacokinetic and pharmacodynamic principles), factors influencing drug effects, routes of drug application.
Special pharmacology including drugs affecting the autonomic nervous system, myorelaxants and ganglioplegic drugs, drugs affecting CNS (drugs used to treat psychiatric disorders, antiepileptics, antiparkinson drugs, hypnotics).

Recommended literature:
Finkel et al.: Lippincott´s Illustrated reviews: Pharmacology 4th edition, Wolters Kluwer, 2009, pp. 564.

Course language:

Notes:

Course assessment
Total number of assessed students: 42

N	P
0.0	100.0

Provides: prof. MVDr. Ján Mojžiš, DrSc., MUDr. Iveta Radváková, PhD.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 6

Recommended semester/trimester of the course:

Course level: I., II., III.

Prerequisities:

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

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

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

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

Course language:

Notes:

Course assessment
Total number of assessed students: 204

A	B	C	D	E	FX	N	P
37.75	20.1	12.75	10.78	11.27	2.45	0.0	4.9

Provides: RNDr. Miroslava Bálintová, PhD., RNDr. Jana Henzelyová, PhD.
Date of last modification: 02.02.2021
Approved: prof. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ GEP/12	**Course name:** Population Genetics
Course type, scope and the method: **Course type:** Lecture / Practice **Recommended course-load (hours):** **Per week:** 2 / 1 **Per study period:** 28 / 14 **Course method:** present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course:	
Course level: II., III.	
Prerequisities:	
Conditions for course completion: Full-time form of teaching: active participation in practicals, written and oral exam. In case of distance learning: active participation in practicals (the online method), practical courses protocols, written exam using the tests prepared in the MOODLE course UBEV/GEP/12 Genetika populácií.	
Learning outcomes: Acquire knowledge about genetic interactions in population. Describe the theoretical and historical ground of population genetics. Identify, characterize and compare fundamental mechanisms (mutation, selection, migration, genetic drift). Interactions leading to intra- and interpopulation variability in population structure. Genetic diversity analysis.	
Brief outline of the course: Factors affecting populations. Genetic variability in populations. Polymorphism, heterozygosity. Fundamental models in population genetics. Hardy-Weinberg theorem for 2, 3 and n alleles. Special cases of random mating (Bruce's genotype ratios, Sex-linked genes). Population genetics and mutations. Assortative mating, calculation and interpretation of inbreeding coefficient. Genetic drift, fixation/elimination of alleles in small populations. One-way, two-way migration. Natural selection in haploid and diploid populations. Populations of plants, animals and human. Darwin's evolution theory, molecular evolution.	
Recommended literature: HALLIBURTON. R. (2004): Introduction to Population Genetics. Pearson Prentice Hall. HARTL, D. L. and CLARK, A. G. (2007): Principles of Population Genetics. 4th ed. Sinauer. RELICHOVÁ, J. (2001): Genetika populací. Masarykova univerzita Brno. Hedrick, P.W.: Genetics of Populations. Jones and Bartlett Publishers 2000.	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 1567

A	B	C	D	E	FX	N	P
19.27	14.74	16.34	16.59	20.55	11.93	0.0	0.57

Provides: RNDr. Linda Petijová, PhD., doc. RNDr. Katarína Bruňáková, PhD.

Date of last modification: 04.02.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/MEVP/22	**Course name:** Research Methodology and Ethics

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

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
To learn the fundamentals of scientific methodology and ethical principles.

Learning outcomes:
To learn the fundamentals of scientific methodology and ethical principles in scientific research..

Brief outline of the course:
Science and research. Definition of science. Fundamental features of science (empirical, objective, self-correcting based on newest proofs, progressive). Definition of research. Basic features of research (controllable, rigorous, systematic, verifiable, empirical, critical). Basic principles of research, induction and deduction. Scientific research. Classification (fundamental, strategic, applied). Scientific methodology: problem identification, formulation of hypothesis, experimental design, observation and experiment, data analysis, hypothese testing, theory formulation, pre-design of perspectives in the given area. Ethical aspects of scientific work (code of conduct, student code of conduct) and publishing (good practise of scientific publishing, considering of plagiarism). Ethical and legislative aspects of biological research (work with laboratory animals, work with GMO).

Recommended literature:
Laake P. et al.: Research Methodology in the Medical and Biological Sciences. eBook ISBN: 9780080552897, 2007

Course language:

Notes:

Course assessment
Total number of assessed students: 9

abs	n
100.0	0.0

Provides: doc. RNDr. Katarína Bruňáková, PhD., prof. RNDr. Peter Fedoročko, CSc., doc. RNDr. Monika Kassayová, CSc.

Date of last modification: 24.11.2021

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ MEVPd/26	**Course name:** Research Methodology and Ethics

Course type, scope and the method:
Course type: Lecture / Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 10s / 45s / 15s
Course method: present

Number of ECTS credits: 4

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

Course level: III.

Prerequisities:

Conditions for course completion:
The study is conducted partly through lectures, seminars, consultations, and mostly through self-study. During the entire study period, the student completes 10 hours of direct teaching, 15 hours of consultations, and 45 hours of self-study. Assessment is carried out individually according to the doctoral student's study plan and based on mastering the required knowledge of methodology and ethics of research. The grading is standard (passed/failed) and reflects sufficient orientation in the given field.

Learning outcomes:
By completing the course, students acquire methodological foundations and ethical principles of scientific research with sufficient orientation in the subject matter. The course also aims to support self-study and independent search for relevant information.

Brief outline of the course:
The course Methodology and Ethics of Scientific Work is part of the doctoral student's study activities and has a partially individual character. The basic outline includes: Science and research. Definition of science. Fundamental features of science (empirical, objective, self-correcting based on newest proofs, progressive). Definition of research. Basic features of research (controllable, rigorous, systematic, verifiable, empirical, critical). Basic principles of research, induction and deduction. Scientific research. Classification (fundamental, strategic, applied). Scientific methodology: problem identification, formulation of hypothesis, experimental design, observation and experiment, data analysis, hypothese testing, theory formulation, pre-design of perspectives in the given area. Ethical aspects of scientific work (code of conduct, student code of conduct) and publishing (good practise of scientific publishing, considering of plagiarism). Ethical and legislative aspects of biological research (work with laboratory animals, work with GMO).

Recommended literature:
1. Laake P. et al.: Research Methodology in the Medical and Biological Sciences. eBook ISBN: 9780080552897, 2007
2. Ethical Code of Pavol Jozef Šafárik University in Košice, 2009
3. Student Ethical Code of Pavol Jozef Šafárik University in Košice, 2014
4. Rector's Decision No. 5/2021 on issuing principles of good practice in scientific publishing at Pavol Jozef Šafárik University in Košice

5. Rector’s Decision No. 21/2021 on rules for assessing plagiarism at Pavol Jozef Šafárik University in Košice and its units

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

abs	n
0.0	0.0

Provides: prof. RNDr. Peter Fedoročko, CSc., doc. RNDr. Monika Kassayová, CSc., doc. RNDr. Katarína Bruňáková, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ TMZ1d/26	**Course name:** Teoretické a metodologické základy dizertačnej práce 1

Course type, scope and the method:
Course type: Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 100s / 15s
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:
The course is taught with an emphasis on the focus of the doctoral dissertation project and in accordance with the specifics of individual topics. Assessment is carried out individually according to the doctoral student's individual study plan. The final evaluation takes place in the form of a seminar, where the student demonstrates independence in studying scientific literature, the ability to critically assess acquired knowledge, propose scientific hypotheses, and present a comprehensive set of theoretical and methodological knowledge related to the dissertation topic before other doctoral students, the supervisor, and at least two members of doctoral board. The grading is standard (passed/failed) and reflects sufficient orientation in the given field.

Learning outcomes:
By completing the course, the student gains sufficient orientation in the issues related to the dissertation project in accordance with the specifics of individual topics. This body of knowledge is essential for a well-established theoretical foundation of the graduate in terms of expertise and also supports the development of their potential in a wide range of applied practice. The learning outcomes will also manifest in the student's understanding of methodological approaches in the relevant field. The course is particularly important for understanding the basic theoretical and methodological aspects of the dissertation topic, with an emphasis on self-study and consultations with the supervisor, program guarantor, and a broad range of consultants.

Brief outline of the course:
The course Theoretical and Methodological Basis of the Dissertation 1 is a compulsory part of the doctoral student's study activities. It is highly individualized, considering the specifics of each dissertation topic. Its basic outline is evident within the doctoral student's individual study plan. The course is crucial for understanding the fundamental theoretical and methodological aspects of the dissertation topic, emphasizing self-study and consultations with the supervisor and a wide range of consultants. It contributes to building the doctoral student's professional potential for the next (scientific) stage of their studies.

Recommended literature:
Not specified due to the nature of the individual dissertation topic. Recommended literature is part of the doctoral student's individual study plan.

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

abs	n
0.0	0.0

Provides: doc. RNDr. Peter Pristaš, CSc., univerzitný profesor, prof. RNDr. Peter Fedoročko, CSc., doc. RNDr. Katarína Bruňáková, PhD., doc. RNDr. Rastislav Jendželovský, PhD., RNDr. Ján Košuth, PhD., RNDr. Jana Kisková, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚBEV/ TMZ2d/26	**Course name:** Theoretical and Methodological Basis of the Dissertation 2

Course type, scope and the method:
Course type: Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 100s / 15s
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

Conditions for course completion:
The course is taught with an emphasis on the focus of the doctoral dissertation project and in accordance with the specifics of individual topics. Assessment is carried out individually according to the doctoral student's individual study plan. The final evaluation takes place in the form of a seminar, where the student demonstrates independence in studying scientific literature, the ability to critically assess acquired knowledge, propose scientific hypotheses, and present a comprehensive set of theoretical and methodological knowledge related to the dissertation topic before other doctoral students, the supervisor, and at least two members of doctoral board. The grading is standard (passed/failed) and reflects sufficient orientation in the given field.

Learning outcomes:
By completing the course, the student gains sufficient orientation in the issues related to the dissertation project in accordance with the specifics of individual topics. This body of knowledge is essential for a well-established theoretical foundation of the graduate in terms of expertise and also supports the development of their potential in a wide range of applied practice. The learning outcomes will also manifest in the student's understanding of methodological approaches in the relevant field. The course is particularly important for understanding the basic theoretical and methodological aspects of the dissertation topic, with an emphasis on self-study and consultations with the supervisor, program guarantor, and a broad range of consultants.

Brief outline of the course:
The course Theoretical and Methodological Basis of the Dissertation 2 is a compulsory part of the doctoral student's study activities. It is highly individualized, considering the specifics of each dissertation topic. Its basic outline is evident within the doctoral student's individual study plan. The course is crucial for understanding the fundamental theoretical and methodological aspects of the dissertation topic, emphasizing self-study and consultations with the supervisor and a wide range of consultants. It contributes to building the doctoral student's professional potential for the next (scientific) stage of their studies.

Recommended literature:
Not specified due to the nature of the individual dissertation topic. Recommended literature is part of the doctoral student's individual study plan.

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

abs	n
0.0	0.0

Provides: doc. RNDr. Peter Pristaš, CSc., univerzitný profesor, prof. RNDr. Peter Fedoročko, CSc., doc. RNDr. Katarína Bruňáková, PhD., doc. RNDr. Rastislav Jendželovský, PhD., RNDr. Ján Košuth, PhD., RNDr. Jana Kisková, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ TMZ3d/26	**Course name:** Theoretical and Methodological Basis of the Dissertation 3

Course type, scope and the method:
Course type: Controlled study hour / Konzultácia
Recommended course-load (hours):
Per week: Per study period: 100s / 15s
Course method: present

Number of ECTS credits: 5

Recommended semester/trimester of the course: 3.

Course level: III.

Prerequisities:

Conditions for course completion:
The course is taught with an emphasis on the focus of the doctoral dissertation project and in accordance with the specifics of individual topics. Assessment is carried out individually according to the doctoral student's individual study plan. The final evaluation takes place in the form of a seminar, where the student demonstrates independence in studying scientific literature, the ability to critically assess acquired knowledge, propose scientific hypotheses, and present a comprehensive set of theoretical and methodological knowledge related to the dissertation topic before other doctoral students, the supervisor, and at least two members of doctoral board. The grading is standard (passed/failed) and reflects sufficient orientation in the given field.

Learning outcomes:
By completing the course, the student gains sufficient orientation in the issues related to the dissertation project in accordance with the specifics of individual topics. This body of knowledge is essential for a well-established theoretical foundation of the graduate in terms of expertise and also supports the development of their potential in a wide range of applied practice. The learning outcomes will also manifest in the student's understanding of methodological approaches in the relevant field. The course is particularly important for understanding the basic theoretical and methodological aspects of the dissertation topic, with an emphasis on self-study and consultations with the supervisor, program guarantor, and a broad range of consultants.

Brief outline of the course:

Recommended literature:
Not specified due to the nature of the individual dissertation topic. Recommended literature is part of the doctoral student's individual study plan.

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

abs	n
0.0	0.0

Provides: doc. RNDr. Peter Pristaš, CSc., univerzitný profesor, prof. RNDr. Peter Fedoročko, CSc., doc. RNDr. Katarína Bruňáková, PhD., doc. RNDr. Rastislav Jendželovský, PhD., RNDr. Ján Košuth, PhD., RNDr. Jana Kisková, PhD.

Date of last modification: 04.12.2025

Approved: prof. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

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. RNDr. Peter Fedoročko, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚBEV/ EMZ1/00	**Course name:** Vertebrate Embryology

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

Number of ECTS credits: 3

Recommended semester/trimester of the course:

Course level: II., III.

Prerequisities:

Conditions for course completion:
Oral examination.

Learning outcomes:
To provide the students with the basic facts on normal development of animals.

Brief outline of the course:
1. History of embryology.
2. Asexual and sexual reproduction. Gametogenesis. Conversion of germ cells into female and male gametes, sexual hormones.
3 .Fertilization.
4. Development of the embryo. Cleavage of the zygote. The main concepts of embryonic development of amphioxus: Blastulation, gastrulation, germ layers formation, throughout organogenesis.
5. Cleavage, blastulation, gastrulation and notogenese of the amphibians.
6. Cleavage, blastulation, gastrulation and notogenese of the reptiles.
7. Cleavage, blastulation, gastrulation and notogenese of the aves.
8. Cleavage, blastulation, gastrulation and notogenese of the mammals. Development of the foetal membranes. Implantation. Placentation in mammals.
9. Organogenesis. Muscular and skeletal systems.
10. Digestive system.
11. Cardiovascular system Respiratory system.
12. Urinary system. Male and female reproductive systems.
13. Nervous system. Eye and ear.

Recommended literature:
Langman, J.: Medical Embryology. Williams & Wilkins, Baltimore, London, 1981
Moore, K. L., Persaud, T. V. N.: Before we are born. W.B. Saunders Company Philadelphia, 1993

Course language:

Notes:
If necessary, subject may be realized in distant form of study.

Course assessment
Total number of assessed students: 170

A	B	C	D	E	FX	N	P
64.71	16.47	9.41	2.35	2.35	0.59	0.0	4.12

Provides: doc. RNDr. Zuzana Daxnerová, CSc., RNDr. Anna Alexovič Matiašová, PhD.

Date of last modification: 23.06.2022

Approved: prof. RNDr. Peter Fedoročko, CSc.