# CONTENT

## COURSE INFORMATION LETTER

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|---|---|
| **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:**<br>**Course type:** Lecture / Practice<br>**Recommended course-load (hours):**<br>**Per week:** 1 / 2 **Per study period:** 14 / 28<br>**Course method:** present | |
| **Number of ECTS credits:** 4 | |
| **Recommended semester/trimester of the course:** 4. | |
| **Course level:** II., III. | |
| **Prerequisities:** | |
| **Conditions for course completion:** | |
| **Learning outcomes:**<br>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:**<br>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:**<br>1. R.D. Goldman a kol.: Live Cell Imaging – A Laboratory Manual, Cold Spring Harbour Laboratory Press, 2010<br>2. J.B. Pawley a kol.: Handbook of Biological Confocal Microscopy, Springer, 2006<br>3. D. Anselmetti a kol.: Single Cell Analysis, Wiley-Blackwell, 2009<br>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:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 6

**Recommended semester/trimester of the course:** 1.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Elaboration of semestral thesis.

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

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

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

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

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 455

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 14.29 | 22.86 | 22.64 | 22.86 | 16.26 | 1.1 |

**Provides:** doc. RNDr. Bianka Bojková, PhD.

**Date of last modification:** 14.07.2022

**Approved:**

## 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:** 4.

**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:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 4

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

**Course level:** II.

**Prerequisities:**

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

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

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

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

**Course language:**

**Notes:**

| **Course assessment**<br>Total number of assessed students: 91 | | | | | |
|---|---|---|---|---|---|
| A | B | C | D | E | FX |
| 92.31 | 5.49 | 2.2 | 0.0 | 0.0 | 0.0 |
| **Provides:** RNDr. Jana Kisková, PhD. | | | | | |
| **Date of last modification:** 01.08.2022 | | | | | |
| **Approved:** | | | | | |

**COURSE INFORMATION LETTER**

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|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚBEV/ BSTII/25 | **Course name:** Bioštatistika II |

**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:** 2., 4.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Oral exam, completion of exercises, elaboration of a semester assignment

**Learning outcomes:**
The course is focused on practical processing of biometric data. It should provide students with knowledge of basic tools for processing their own measurements in the processing of final theses.

**Brief outline of the course:**
Lectures:
1. Biometric data and their graphical presentation, univariate statistics data
2. Normalization and standardization of data
3. Exploratory data analysis
4. Basics of Univariate Statistics, Part 1
5. Basics of Univariate Statistics, 2nd time
6. Biometric data and graphical presentation, data of multivariate statistics
7. Binary, quantitative and semi-quantitative data in biometrics
8. Multivariate clustering analyses
9. Ordinal analyses of multivariate data, methods of hypothesis formation
10. Ordinal analyses of multivariate data, methods testing hypotheses
11. Introduction to biometric data processing in the context of spatial diversity
12. Selected topics of biometric processing of digital image data
13. Introduction to Chemometric Data Processing
14. Biometrics and biodiversity

Exercises:
Implementation of the lectured topics on sample datasets. Past, R environment.
Data Normalization and Standardization, Logarithmic and Box-Cox Transform, Histogram, Biplot, 3D Plot, Radar Fence, Bar-Box-Pie-Jitter-Violin Graph, Summary Statistics, Normality and Homoscedasticity Tests, t Test, F Test, Mann-Whitney Test, Kolmogorov-Smirnov Test, One-Factor and Two-Factor ANOVA, Correlation Table, Heatmap, ANCOVA, pivot table, clustering analyses, K-means clustering, principal component analysis, canonical correspondence analysis, non-metric multidimensional scaling, linear discriminant analysis, redundancy analysis, MANOVA, one-factor

and two-factor PERMANOVA, linear regression, Mantel's test, autocorrelation analysis, Thin-plate splines, elliptic fourier analysis, allometric analysis, alpha and beta diversity indicators

**Recommended literature:**

Zar, J.H. 1996. Biostatistical analysis. 3rd ed. Prentice Hall.
Legendre, P. & L. Legendre. 1998. Numerical Ecology, 2nd English ed. Elsevier.
Borcard, D., Gillet, F. & P. Legendre. 2018. Numerical Ecology with R.

**Course language:**
Slovak, English

**Notes:**

**Course assessment**
Total number of assessed students: 3

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 0.0 | 0.0 | 66.67 | 0.0 | 33.33 | 0.0 |

**Provides:** doc. Mgr. Vladislav Kolarčik, PhD., RNDr. Ivana Ihnatová, PhD.

**Date of last modification:** 06.03.2025

**Approved:**

**COURSE INFORMATION LETTER**

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/ MEB1/03 | **Course name:** Cell metabolism |
|---|---|

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

**Number of ECTS credits:** 6

**Recommended semester/trimester of the course:** 3.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Oral examination.

**Learning outcomes:**
To provide the students with knowledge about the principal metabolic processes in living cells.

**Brief outline of the course:**
Carbohydrates – significance and role in animal organisms. Inborn errors of carbohydrate and lipid metabolism in humans. Lipid metabolism. Role of the liver and adipose tissue in lipid metabolism. Plasma lipoproteins – metabolism and disorders. Cholesterol and atherosclerosis. Protein metabolism and its inborn errors. Water and solute metabolism. Physiology and regulatory mechanisms of water-base balance in animal organisms. Metabolic regulation. Topochemistry of metabolic processes

**Recommended literature:**
1. Murray, R. K., Grammer, D. K., Mayes, P. A., Rodwell, V.W.: Harper‘s Biochemistry. Prentice-Hall, Appleton & Lange, 1993
2. Vasudevan D.M. and co.: Textbook of Biochemistry for Medical Students. Jaypee Brothers Medical Publishers 2011

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 259

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 29.73 | 24.32 | 19.69 | 13.9 | 8.11 | 4.25 |

**Provides:** doc. RNDr. Monika Kassayová, CSc.

**Date of last modification:** 23.09.2021

**Approved:**

## 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:** 2.

**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:** |

## 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:** 2.

**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:**

## COURSE INFORMATION LETTER

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|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚBEV/ SDPa/15 | **Course name:** Diploma Thesis Seminar |
| **Course type, scope and the method:**<br>**Course type:**<br>**Recommended course-load (hours):**<br>**Per week: Per study period:**<br>**Course method:** present | |
| **Number of ECTS credits:** 4 | |
| **Recommended semester/trimester of the course:** 1. | |
| **Course level:** II. | |
| **Prerequisities:** | |
| **Conditions for course completion:** | |
| **Learning outcomes:** | |
| **Brief outline of the course:** | |
| **Recommended literature:** | |
| **Course language:** | |
| **Notes:** | |
| **Course assessment**<br>Total number of assessed students: 306 | |

| abs | n |
|---|---|
| 100.0 | 0.0 |

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| **Provides:** |
| **Date of last modification:** 03.05.2015 |
| **Approved:** |

## COURSE INFORMATION LETTER

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|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚBEV/ SDPb/15 | **Course name:** Diploma Thesis Seminar |
| **Course type, scope and the method:**<br>**Course type:**<br>**Recommended course-load (hours):**<br>**Per week: Per study period:**<br>**Course method:** present | |
| **Number of ECTS credits:** 4 | |
| **Recommended semester/trimester of the course:** 2. | |
| **Course level:** II. | |
| **Prerequisities:** | |
| **Conditions for course completion:** | |
| **Learning outcomes:** | |
| **Brief outline of the course:** | |
| **Recommended literature:** | |
| **Course language:** | |
| **Notes:** | |
| **Course assessment**<br>Total number of assessed students: 254 | |

| abs | n |
|---|---|
| 100.0 | 0.0 |

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|---|---|
| **Provides:** | |
| **Date of last modification:** 03.05.2015 | |
| **Approved:** | |

## COURSE INFORMATION LETTER

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚBEV/ SDPc/15 | **Course name:** Diploma Thesis Seminar |
| **Course type, scope and the method:**<br>**Course type:**<br>**Recommended course-load (hours):**<br>**Per week: Per study period:**<br>**Course method:** present | |
| **Number of ECTS credits:** 4 | |
| **Recommended semester/trimester of the course:** 3. | |
| **Course level:** II. | |
| **Prerequisities:** | |
| **Conditions for course completion:** | |
| **Learning outcomes:** | |
| **Brief outline of the course:** | |
| **Recommended literature:** | |
| **Course language:** | |
| **Notes:** | |
| **Course assessment**<br>Total number of assessed students: 267 | |

| abs | n |
|---|---|
| 100.0 | 0.0 |

| | |
|---|---|
| **Provides:** | |
| **Date of last modification:** 03.05.2015 | |
| **Approved:** | |

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/ SDPd/15 | **Course name:** Diploma Thesis Seminar |
|---|---|

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

**Number of ECTS credits:** 4

**Recommended semester/trimester of the course:** 4.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 261

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 85.44 | 9.96 | 3.07 | 0.77 | 0.77 | 0.0 |

**Provides:**

**Date of last modification:** 03.05.2015

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 16

**Recommended semester/trimester of the course:**

**Course level:** II.

**Prerequisities:**

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

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

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

**Recommended literature:**
Mentioned in the approved thesis assignment.

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 62

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 53.23 | 27.42 | 11.29 | 4.84 | 3.23 | 0.0 |

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| **Provides:** |
| **Date of last modification:** 31.07.2022 |
| **Approved:** |

## 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:** 1.

**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.

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| **Date of last modification:** 23.06.2022 |
| **Approved:** |

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 6

**Recommended semester/trimester of the course:** 1.

**Course level:** II.

**Prerequisities:**

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

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

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

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

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 1146

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 44.07 | 24.0 | 22.51 | 7.77 | 1.57 | 0.09 |

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

**Date of last modification:** 22.09.2023

| **Approved:** |
| --- |

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 3

**Recommended semester/trimester of the course:** 3.

**Course level:** II.

**Prerequisities:**

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

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

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

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

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

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 700

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 11.71 | 22.29 | 25.71 | 23.57 | 15.14 | 1.57 |

**Provides:** prof. RNDr. Pavol Mártonfi, PhD., prof. RNDr. Ľubomír Kováč, CSc., RNDr. Linda Petijová, PhD.

**Date of last modification:** 24.07.2022

**Approved:**

## 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:** 2.

**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:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/GM1/03 | **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:** II.

**Prerequisities:** ÚBEV/UGM1/03

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

**Learning outcomes:**
Obtaining the knowledge on 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: 259

| A | B | C | D | E | FX | N | P |
|---|---|---|---|---|---|---|---|
| 57.53 | 22.39 | 8.49 | 3.86 | 1.54 | 0.39 | 0.0 | 5.79 |

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

**Date of last modification:** 23.06.2022

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/GMC/15 | **Course name:** Genetics and Molecular Cytology |
|---|---|

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

**Number of ECTS credits:** 4

**Recommended semester/trimester of the course:**

**Course level:** II.

**Prerequisities:** ÚBEV/GEP/12 and ÚBEV/MOG/03 and ÚBEV/FG/14

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 109

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 30.28 | 19.27 | 20.18 | 15.6 | 14.68 | 0.0 |

**Provides:**

**Date of last modification:** 16.05.2018

**Approved:**

## 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:** 2.

**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.

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|---|
| **Date of last modification:** 26.11.2021 |
| **Approved:** |

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 3

**Recommended semester/trimester of the course:** 1.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Recognition.
Oral examination.

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

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

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

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 1117

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 39.84 | 24.08 | 23.63 | 6.98 | 1.88 | 3.58 |

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

**Date of last modification:** 22.09.2023

| **Approved:** |
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## 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:** 1., 3.

**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.

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| **Date of last modification:** 19.02.2024 |
| **Approved:** |

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 6

**Recommended semester/trimester of the course:** 1.

**Course level:** II.

**Prerequisities:**

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

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

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

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

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 319

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 62.07 | 27.9 | 7.52 | 1.88 | 0.31 | 0.31 |

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

**Date of last modification:** 31.05.2022

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/ LDM/16 | **Course name:** Laboratory Diagnostics in 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:** 4

**Recommended semester/trimester of the course:** 2.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**
Students will gain an overview of classical and modern diagnostic microbiological methods routinely used in microbiological laboratories. Through hands-on practical classes, the students will acquire important laboratory skills that will promote theory-practice integration.

**Brief outline of the course:**
History of microbiological diagnostics. Laboratory practice. Methods of laboratory diagnostics of microorganisms. Phenotypic methods of species identification of microorganisms. Molecular-biological methods of identification of microorganisms. Methods of species identification in microbial communities. Applications of microbiological-diagnostic methods in practice. Virulence factors of microorganisms and their interaction with immune mechanisms. Clinically important representatives of bacterial, viral, fungal and parasitic diseases of animals and humans.

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 98

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 60.2 | 31.63 | 5.1 | 1.02 | 2.04 | 0.0 |

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

**Date of last modification:** 23.06.2022

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/ MEM1/99 | **Course name:** Light and Electron Microscopy techniques |
|---|---|

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

**Number of ECTS credits:** 3

**Recommended semester/trimester of the course:** 3.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
active presence at lectures and exercises

**Learning outcomes:**
The aim of the subject is to teach students, how to process biological material for analyses using light, fluorescent and electron microscope and to acquaint them with microscopic techniques, which are most commonly used in the biological research.

**Brief outline of the course:**
1. Visible light and its properties. Lenses, objectives.
2. History of microscopy, principles of visualization of biological samples using brightfield microscope.
3. Special types of light microscopes.
4. Isolation of biological material, fixation, dehydration, embedding and staining of samples for light microscopy.
5. Types of microtomes used in histology laboratories and their operation.
6. Principles of fluorescence, fluorescent molecules and fluorescent methods for analysis of biological samples.
7. Principles of immunolabelling of biological samples for brightfield and fluorescent microscopy.
8. Analysis of biological samples using epifluorescent and confocal microscope.
9. Processing and contrasting of biological samples for transmission and scanning electron microscopy.
10. Methods of immunolabelling of biological samples using colloidal gold nanoparticles and principles of autoradiography.
11. Construction and operation of electron microscope, types of electron microscopes used in biological research.
12. Special types of electron microscopes.
13. Photography of samples and analysis of resulting image.

**Recommended literature:**
Gage et al.: Whole animal perfusion fixation for rodents, 2012, Journal of Visualized Experiments, 65:e3564, 1-9

Paddock W.: Principles and Practices of Laser Scanning Confocal Microscopy, 2000, Molecular Biotechnology, 16, 127-149
Griffiths and Lucocq: Antibodies for immunolabelling by light and electron microscopy: not for the faint hearted, 2014, Histochem Cell Biol, 142:347-360
A. Kaech: An Introduction to Electron Microscopy Instrumentation, Imaging and Preparation, Centre for Microscopy and Image Analysis, University of Zurich, 2013
M. Držík a kol.: Moderná mikroskopia a digitálne spracovanie obrazu, FMFI UK, Bratislava, 2008
J. Polónyi, P. Mráz: Metódy elektrónovej mikroskopie živočíšnych tkanív. Veda Bratislava, 1988M.
Bobák, J. Horák: Elektrónová mikroskopia. Učebné texty, PF UK Bratislava, 1981

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 144

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 90.97 | 6.25 | 0.69 | 2.08 | 0.0 | 0.0 |

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

**Date of last modification:** 10.01.2022

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 2

**Recommended semester/trimester of the course:**

**Course level:** II.

**Prerequisities:**

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

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

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

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

**Course language:**
Slovak

**Notes:**

**Course assessment**
Total number of assessed students: 10

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

**Provides:** prof. PhDr. Eugen Andreanský, PhD.

**Date of last modification:** 01.02.2022

**Approved:**

## 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:** 2.

**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:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/ MZO1/03 | **Course name:** Molecular Basis of Ontogenetic Development |
|---|---|

**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:** II.

**Prerequisities:**

**Conditions for course completion:**
written examination (pass three tests)

**Learning outcomes:**
Acquiring of basic knowledge about molecular and regulatory mechanisms of ontogenetic development of multicellular organisms (animal and plant organisms).

**Brief outline of the course:**
Molecular and regulatory basis of ontogenesis:
1) Totipotency of zygote and genomic equivalence as general pre-requisite for ontogenetic development. Cell adhesion and migration, positional information, developmental signals and morfogens. 2) Induction, determination and differentiation. Selective gene expression, combinatory control of gene expression, lateral inhibition. 3) Mechanisms of epigenetic memory. DNA methylation, genomic imprinting, X-chromosome inactivation. Morphogenesis (asymmetry and polarity of cells, reorganization of cytoskeleton, embryonic folding and flexion). 4) Genes controllig development (selector genes, regulators and super-regulators, homeotic genes). Programmed cell death (apoptosis autophagy). 5) 1st test.
Ontogenetic development of drosophila:
6) Oogenesis. Specification and polarization of oocyte, determination of oocyte axes. Fertilization, cleavage and early embryogenesis. 7) Early embryo polarization and determination of embryo axes. Specification of body segments, segmentation genes. 8) Gastrulation (germ layers formation, neurulation). Morphogenesis and cell rearrangements. Development of some organs and organ systems. Pupation and metamorphosis. 9) 2nd test.
Ontogenetic development of mammals:
10) Fertilization. Cleavage and early embryogenesis (blastulation, gastrulation, neurulation). 11) Early embryo polarization and determination of embryo axes. Induction of primitive streak and germ layers formation. Specification and development of CNS. Somitogenesis, myogenesis. 12) Development of some organs and organ systems. 13) 3rd test.

**Recommended literature:**
S.F. Gilbert, M.J.F. Barresi: Developmental Biology, 11th edition, Sinauer Associates, Inc., 2016

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 459

| A | B | C | D | E | FX | N | P |
|---|---|---|---|---|---|---|---|
| 37.69 | 21.35 | 12.42 | 14.38 | 7.84 | 4.79 | 0.0 | 1.53 |

**Provides:** RNDr. Zuzana Jendželovská, PhD.

**Date of last modification:** 09.09.2021

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 2

**Recommended semester/trimester of the course:**

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 8

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

**Provides:** doc. PhDr. Kristína Bosáková, PhD.

**Date of last modification:** 01.02.2022

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 5

**Recommended semester/trimester of the course:**

**Course level:** II.

**Prerequisities:**

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

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

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

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

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 9

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 44.44 | 44.44 | 11.11 | 0.0 | 0.0 | 0.0 |

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

**Date of last modification:** 31.07.2022

**Approved:**

## 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:** 1.

**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:** |

## COURSE INFORMATION LETTER

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚBEV/ ER1/01 | **Course name:** Plant Embryology |
| **Course type, scope and the method:**<br>**Course type:** Lecture / Practice<br>**Recommended course-load (hours):**<br>**Per week:** 1 / 1 **Per study period:** 14 / 14<br>**Course method:** present | |
| **Number of ECTS credits:** 3 | |
| **Recommended semester/trimester of the course:** 1. | |
| **Course level:** II. | |
| **Prerequisities:** | |
| **Conditions for course completion:**<br>1. Participation at the practices - work with permanent slides, work with living material, outline of the studied phenomena and their description<br>2. Passing the examination | |
| **Learning outcomes:**<br>Student knows basic breeding strategies and reproduction ways of angiosperms. He/she is informed about micro- and megagametogenesis from archesporal cell up to mature gametophyte. He/she knows the origin of new organism and the processes leading to it. He/she is familiar with phenomena connected with embryo development and its relations to other parts of seeds. He/she is informed on apomixis. He/she knows the way from seed to photosyntethising plant of new generation. He/she obtains information on origin and development of the embryo of gymnosperms. | |
| **Brief outline of the course:**<br>1. Embryology as science<br>2 Breeding strategies<br>3. Female gametophyte<br>4. Male gametophyte<br>5. Pollination, progamogenetic phase of fertilization processes<br>6. Fertilization, gamogenetic and postgamogenetic phase, incompatibilities<br>7. Embryo, general characeters and development<br>8. Embryo of monocotyledones and dicotyledones<br>9. Endosperm<br>10. Apomixis<br>11. Seed, germination of seeds<br>12. Embryology of gymnosperms | |
| **Recommended literature:**<br>Erdelská O., Švubová R., Mártonfiová L., Lux A. (2017): Embryológia krytosemenných rastlín. Veda, Bratislava<br>Richards, A. J. (1997): Plant Breeding Systems. Chapman & Hall, London | |
| **Course language:** | |

**Notes:**

**Course assessment**
Total number of assessed students: 124

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 36.29 | 28.23 | 18.55 | 10.48 | 6.45 | 0.0 |

**Provides:** RNDr. Lenka Mártonfiová, PhD.

**Date of last modification:** 18.07.2022

**Approved:**

**COURSE INFORMATION LETTER**

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/ MR1/03 | **Course name:** Plant Metabolism |
|---|---|

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

**Number of ECTS credits:** 6

**Recommended semester/trimester of the course:**

**Course level:** II.

**Prerequisities:**

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

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

**Brief outline of the course:**

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

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

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 133

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 23.31 | 20.3 | 20.3 | 15.04 | 18.8 | 2.26 |

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

**Date of last modification:** 31.07.2022

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/ TR1/99 | **Course name:** Plant Taxonomy |
|---|---|

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

**Number of ECTS credits:** 5

**Recommended semester/trimester of the course:**

**Course level:** II.

**Prerequisities:**

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

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

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

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

**Recommended literature:**

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

**Course language:**

**Notes:**

**Course assessment**

Total number of assessed students: 153

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 37.91 | 20.92 | 20.26 | 10.46 | 7.19 | 3.27 |

**Provides:** prof. RNDr. Pavol Mártonfi, PhD., doc. Mgr. Vladislav Kolarčik, PhD.

**Date of last modification:** 24.07.2022

**Approved:**

## 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:** 1.

**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:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/IMUC1/03 | **Course name:** Practicals in Immunology |
|---|---|

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

**Number of ECTS credits:** 3

**Recommended semester/trimester of the course:** 1.

**Course level:** II.

**Prerequisities:** ÚBEV/IMU1/03

**Conditions for course completion:**
activity at the lessons, protocols from practical work,
oral examination

**Learning outcomes:**
The practical course will focus on basic techniques and skills in immunology laboratories in order to have technical foundation to suggest experimental analysis of some immunological questions.

**Brief outline of the course:**
Special immunology practicals cover common immunological techniques as well as techniques relevant to the research projects at the department. The main aim is to understand the host immune response to infection. Practicals also include a study of the histophysiology of animal immune organs. The students will learn to perform immunological experiments, including critical evaluation of the results.

**Recommended literature:**
Study materials provided by teacher.

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 394

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 70.3 | 19.29 | 9.39 | 0.51 | 0.0 | 0.51 |

**Provides:** RNDr. Vlasta Demečková, PhD., univerzitná docentka, RNDr. Mária Ryniková, PhD.

**Date of last modification:** 22.09.2023

**Approved:**

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

**Recommended semester/trimester of the course:**

**Course level:** I., II., P

**Prerequisities:**

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

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

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

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

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

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 82

| abs | n |
|---|---|
| 7.32 | 92.68 |

**Provides:** Mgr. Agata Dorota Horbacz, PhD.

**Date of last modification:** 29.03.2022

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 2

**Recommended semester/trimester of the course:**

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 2

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

**Provides:** PhDr. Dušan Hruška, PhD.

**Date of last modification:** 27.04.2022

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/VKM1/13 | **Course name:** Selected topics in Microbiology and Virology |
|---|---|

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

**Number of ECTS credits:** 3

**Recommended semester/trimester of the course:**

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Elaboration and presentation of pre-assigned topics. Active participation in discussions on lecture topics. Final evaluation in the form of a discussion on a randomly selected topic from the syllabus.

**Learning outcomes:**
Students will expand and consolidate their knowledge on basic molecular microbiological processes in prokaryotic organisms, while gaining the latest knowledge in selected areas of molecular biology and genetics of prokaryotic cells. Within the course, they will also practice skills in working with scientific literature and methods of synthesis and processing of obtained information, as well as their presentation to the professional community.

**Brief outline of the course:**
1. Diversity of prokaryotic microorganisms, "black matter" in molecular microbiology 2. Energy metabolism of prokaryotic cell - redox tower, lithotrophy principle, anoxygenic photophosphorylation 3. Peculiarities of gene expression regulation in prokaryotic cells, sporulation regulation in Bacillus spp. 4. Molecular mechanisms of adaptation of prokaryotic cells to extreme environments 5. Biology of restriction-modification systems and coevolution of bacteriophages and RMS 6. Genetics, genetic organization of bacteriophages, modular structure of bacteriophage genomes, CRISPR / Cas systems 7. Bacterial plasmids, their evolution, diversity, modular structure, incompatibility systems, copy number control. 8. Mechanisms of spreading antibiotic resistance in a non-clinical environment

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 24

| abs | n |
|---|---|
| 100.0 | 0.0 |

**Provides:** doc. RNDr. Peter Pristaš, CSc., univerzitný profesor

| |
|---|
| **Date of last modification:** 01.02.2022 |
| **Approved:** |

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

**Recommended semester/trimester of the course:** 1.

**Course level:** I., II., P

**Prerequisities:**

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

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

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

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

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 16384

| abs | abs-A | abs-B | abs-C | abs-D | abs-E | n | neabs |
|---|---|---|---|---|---|---|---|
| 85.48 | 0.06 | 0.0 | 0.0 | 0.0 | 0.04 | 9.25 | 5.17 |

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

**Date of last modification:** 07.02.2024

**Approved:**

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

**Recommended semester/trimester of the course:** 2.

**Course level:** I., II., P

**Prerequisities:**

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

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

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

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

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 14591

| abs | abs-A | abs-B | abs-C | abs-D | abs-E | n | neabs |
|---|---|---|---|---|---|---|---|
| 83.72 | 0.47 | 0.01 | 0.0 | 0.0 | 0.04 | 11.49 | 4.26 |

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

**Date of last modification:** 07.02.2024

**Approved:**

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

**Recommended semester/trimester of the course:** 3.

**Course level:** I., II.

**Prerequisities:**

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

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

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

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

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 9620

| abs | abs-A | abs-B | abs-C | abs-D | abs-E | n | neabs |
|---|---|---|---|---|---|---|---|
| 87.8 | 0.06 | 0.01 | 0.0 | 0.0 | 0.02 | 5.16 | 6.95 |

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

**Date of last modification:** 07.02.2024

**Approved:**

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

**Recommended semester/trimester of the course:** 4.

**Course level:** I., II.

**Prerequisities:**

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

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

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

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

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 6174

| abs | abs-A | abs-B | abs-C | abs-D | abs-E | n | neabs |
|---|---|---|---|---|---|---|---|
| 82.33 | 0.26 | 0.03 | 0.0 | 0.0 | 0.0 | 8.68 | 8.7 |

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

**Date of last modification:** 07.02.2024

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/ BKB/20 | **Course name:** Stem Cell Biology |
|---|---|

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

**Number of ECTS credits:** 4

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**
The aim of the course is to ground students with basic knowledge about biology of hematopoietic stem cells and about the embryonic, adult and cancer stem cells. The purpose of the course is to acquaint student with regulation of self-renewal, proliferation, differentiation and plasticity of stem cells, as well as the humoral factors involved in these processes. Moreover, the microenvironment of stem cells and clinical use of cytokines and hematopoietic stem cells will be discussed during the course, together with the induced pluripotent stem cells and potential usage of stem cells in regenerative medicine.

**Brief outline of the course:**
1. Stem cell, the features of stem cells;
2. Pluripotent/multipotent hematopoietic stem cells;
3. The investigation methods of stem cells, the models of functional organization of population of hematopoietic stem cells, differentiation antigens;
4. Myeloid hematopoietic stem cell;
5. Megakaryocyte–erythroid progenitor cells;
6. Common lymphoid progenitor;
7. Microenvironment of stem cells, homing and mobilization of hematopoietic stem cells;
8. Plasticity of stem cells and factors regulating self-renewal, proliferation and differentiation;
9. Cytokines, hematopoietic growth factors and interleukins in hematopoiesis;
10. Clinical use of cytokines and hematopoietic stem cells;
11. Embryonic and induced pluripotent stem cells and their potential in regenerative medicine;
12. Adult stem cells and their potential in regenerative medicine;
13. Cancer stem-like cells.

**Recommended literature:**
Farrar W.B.: Cancer Stem Cells. Cambridge University Press, 2010
Majumder S.: Stem Cells and Cancer. Springer Science+Business Media, LLC 2009
Scatena R., Mordente A., Giardina B.: Advances in Cancer Stem Cell Biology. Springer Science +Business Media, LLC 2012

Simmons A.: Hematology. A Combined Theoretical & Technical Approach, W.B. Saunders Company, Philadelphia, 1989
Yu J.S.: Cancer Stem Cells. Methods and protocols. Humana Press, a part of Springer Science +Business Media, LLC 2009
Relevantné vedecké práce z uvedenej problematiky publikované v odborných časopisoch a dostupné v medzinárodných databázach (https://www.ncbi.nlm.nih.gov/pubmed/; https://www.scopus.com/search/form.uri?display=basic; https://www.sciencedirect.com/), napr.
Zakrzewski a kol., Stem cells: past, present, and future. Stem Cell Research & Therapy (2019), 10:68: https://doi.org/10.1186/s13287-019-1165-5
Batlle – Clevers, Cancer stem cells revisited. Nature medicine (2017), 23 (10): doi:10.1038/nm.4409
Tweedel, The Adaptability of Somatic Stem Cells: A Review. Journal of Stem Cells and Regenerative Medicine (2017), 13(1)
Ferraro – Lo Celso. Adult stem cells and their niches. Adv Exp Med Biol. (2010), 695: 155–168. doi:10.1007/978-1-4419-7037-4_11

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 39

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 35.9 | 10.26 | 12.82 | 23.08 | 15.38 | 2.56 |

**Provides:** prof. RNDr. Peter Fedoročko, CSc., RNDr. Jana Vargová, PhD.

**Date of last modification:** 28.09.2021

**Approved:**

## COURSE INFORMATION LETTER

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

**Course assessment**
Total number of assessed students: 65

| abs | n |
|---|---|
| 100.0 | 0.0 |

| |
|---|
| **Provides:** |
| **Date of last modification:** 30.11.2021 |
| **Approved:** |

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

**Recommended semester/trimester of the course:**

**Course level:** I., II., P

**Prerequisities:**

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

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

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

11. Capsizing
12. Commands

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 254

| abs | n |
|---|---|
| 35.83 | 64.17 |

**Provides:** Mgr. Dávid Kaško, PhD.

**Date of last modification:** 29.03.2022

**Approved:**

## COURSE INFORMATION LETTER

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚTVŠ/ KP/12 | **Course name:** Survival Course |

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

**Number of ECTS credits:** 2

**Recommended semester/trimester of the course:**

**Course level:** I., II., P

**Prerequisities:**

**Conditions for course completion:**
Completion: passed
Condition for successful course completion:
- active participation in line with the study rule of procedure and course guidelines,
- effective performance of all the tasks defined in the course syllabus

**Learning outcomes:**
Content standard:
The student demonstrates relevant knowledge and skills in the field, which content is defined in the course syllabus and recommended literature.
Performance standard:
Upon completion of the course students are able to meet the performance standard and should:
- acquire knowledge about safe stay and movement in natural environment,
- obtain theoretical knowledge and practical skills to solve extraordinary and demanding situations connected with survival and minimization of damage to health,
- be able to resist and face situations related to overcoming barriers and obstacles in natural environment,
- be able implement the acquired knowledge as an instructor during summer sport camps for children and youth within recreational sport.

**Brief outline of the course:**
Brief outline of the course:
1. Principles of conduct and safety in the movement in unfamiliar natural environment
2. Preparation and guidance of a hike tour
3. Objective and subjective danger in the mountains
4. Principles of hygiene and prevention of damage to health in extreme conditions
5. Fire building
6. Movement in the unfamiliar terrain, orientation and navigation
7. Shelters
8. Food preparation and water filtering
9. Rappelling, Tyrolian traverse
10. Transport of an injured person, first aid

**Recommended literature:**

1. JUNGER, J. et al. Turistika a športy v prírode. Prešov: Fakulta humanitných a prírodných vied PU v Prešove. 2002. 267s. ISBN 80-8068-097-3.
2. PAVLÍČEK, J. Člověk v drsné přírodě. 3. vyd. Praha: Práh. 2002. ISBN 8072520598.
3. WISEMAN, J. SAS: příručka jak přežít. Praha: Svojtka & Co. 2004. 566s. ISBN 8072372807.

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 489

| abs | n |
|---|---|
| 46.42 | 53.58 |

**Provides:** Mgr. Ladislav Kručanica, PhD.

**Date of last modification:** 16.05.2023

**Approved:**

## 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:** 1., 3.

**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:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

| **Course ID:** ÚBEV/VIR/21 | **Course name:** Virology |
|---|---|

**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:** 1.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**
Virology course will provide in-depth knowledge and understanding the biology, genetics and genomics of viruses.You will become familiar with professional terminology in the field of virology, understand the specifics of the biology of viruses, their multiplication, spreading and how they cause diseases. Through hands-on practical classes, the student will acquire the fundamental skills regarding the characterization and enumeration of bacteriophages.

**Brief outline of the course:**
Lectures: This course is focused on basic concepts of morphology, molecular biology, genetics, genomics, evolution and taxonomy of viruses. Students will receive information about bacteriophages, viruses infecting bacteria as well as viruses causing major human and animal diseases (oncogenic viruses, herpes, coronaviruses, HIV) as well as viruses infecting plant cells and prions. Attantion is also devoted to the pathogenesis and epidemiology of viral infections and laboratory diagnosis of viral infections.
Laboratory classess are designed to master the basic methodological procedures for the identification and enumeration of bacteriophages, as well as the basic procedures used for the detection of viruses infecting eukaryotic cells.
SYLABUS:
• Introduction to the issue and terminology
• Virus morphology
• Life cycle and genetics of viruses
• Life cycle and genetics of viruses II
• Classification and taxonomy of viruses
• Bacteriophages - bacterial viruses
• Viruses causing major human and animal diseases
• Satellites, viroids, prions, viruses infecting plant cells
• Prevention and treatment of viral infections
• Pathogenesis and epidemiology of viral diseases
• Laboratory diagnosis of viral infections
• Evolution of viruses

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 71

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 87.32 | 9.86 | 0.0 | 1.41 | 1.41 | 0.0 |

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

**Date of last modification:** 23.06.2022

**Approved:**

## COURSE INFORMATION LETTER

**University:** P. J. Šafárik University in Košice

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 6

**Recommended semester/trimester of the course:**

**Course level:** I., II.

**Prerequisities:**

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

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

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

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

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 1059

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 25.31 | 23.23 | 23.61 | 18.41 | 7.74 | 1.7 |

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

**Date of last modification:** 10.12.2021

**Approved:**