# CONTENT

**COURSE INFORMATION LETTER**

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚCHV/ NMR1/00 | **Course name:** 1D & 2D NMR Spectroscopy |

**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:** 2.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
1. Attendance at lectures and seminars (this also applies to the online form of teaching)
2. Activity at seminars (also applies to the online form of teaching) - theoretical preparation of students for all seminars is required
3. Elaboration of written assignments (20% of the total evaluation) according to the teacher's instructions.
4. Passing the final test (30% of the total evaluation).
5. Exam (written 25% and oral part 25%).

**Learning outcomes:**
The aim of the course is to get acquainted with 1D and 2D NMR methods and the application of the acquired knowledge in solving NMR problems.

**Brief outline of the course:**
1. Advanced 1D NMR methods
a) 13C NMR experiments – APT, DEPT
b) NOE experiments
c) Selective experiments
2. 2D NMR methods
a) Proton-proton correlation through coupling – COSY, TOCSY
b) Proton-proton correlation through space - NOESY
c) Proton-carbon correlation – HSQC/HMQC/HETCOR, HMBC, H2BC, EXSIDE
d) Carbon-carbon correlation - INADEQUATE

**Recommended literature:**
1. H. Friebolin: Basic One- and Two-Dimensional NMR Spectrocopy, 5. Ed., Wiley, 2010.
2. T. D. W. Claridge: High-Resolution NMR Techniques in Organic Chemistry, 5. Ed., Elsevier, 2016.
3. Atta-ur-Rahman, M. I. Choudhary: Solving Problems with NMR spectroscopy, Academic Press 1996.

**Course language:**
english

**Notes:**
Teaching is carried out in person or, if necessary, online using the MS Teams or BBB (BigBlueButton) tool. The form of teaching is specified by the teacher at the beginning of the semester, updated continuously.

**Course assessment**
Total number of assessed students: 193

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 40.41 | 25.39 | 23.83 | 8.81 | 1.55 | 0.0 |

**Provides:** doc. RNDr. Mária Vilková, PhD.

**Date of last modification:** 28.01.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚCHV/ BCH1a/03 | **Course name:** Biochemistry I |
|---|---|

**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:** I., II.

**Prerequisities:**

**Conditions for course completion:**
Test and oral examination.

**Learning outcomes:**
The aim of Biochemistry I teaching is to acquire knowledge in the field of living organisms on the basis of the molecular structure and properties of biolomolecules.

**Brief outline of the course:**
Basic information on structure and properties of biomolecules( aminoacids, nucleotides,lipids, sugars, proteins, polynucleotides, polysaccharides, membranes, signal molecules).

**Recommended literature:**
Voet D., Voetová J. G., Biochemie, Victoria Publishing, Praha, 1994
Škárka B., Ferenčík M., Biochémia, Alfa, Bratislava, 2001
Musil J., Nováková O., Biochemie v obrazech a schématech, Avicenum, Praha, 1990
Berg J. M., Tymoczko J. L., Stryer L., Biochemistry, W. H. Freeman and Company, NY, 2007

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 673

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 12.63 | 22.29 | 32.1 | 15.75 | 16.49 | 0.74 |

**Provides:** prof. Ing. Marián Antalík, DrSc., RNDr. Nataša Tomášková, PhD.

**Date of last modification:** 18.11.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚCHV/ BCH1b/03 | **Course name:** Biochemistry II |
|---|---|

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

**Number of ECTS credits:** 5

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

**Course level:** II.

**Prerequisities:** ÚCHV/BCH1a/03

**Conditions for course completion:**
Test and oral examination.

**Learning outcomes:**
The aim of biochemistry teaching is to acquire knowledge in the field of living organisms on the basis of their molecular structure information on cell metabolism.

**Brief outline of the course:**
Basic principle of metabolism, basic metabolic pathways and cycles, integration of cell metabolism.

**Recommended literature:**
Voet D., Voetová J. G.: Biochemie, Victoria Publishing, Praha, 1994
Škárka B., Ferenčík M.: Biochémia, Alfa, Bratislava, 2001
Berg J. M., Tymoczko J. L., Stryer L.: Biochemistry, W. H. Freeman and Company, New York, 2007
Musil J., Nováková O.: Biochemie v obrazech a schématech, Avicenum, Praha, 1990

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 312

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 32.05 | 28.85 | 15.71 | 9.94 | 10.9 | 2.56 |

**Provides:** prof. Ing. Marián Antalík, DrSc.

**Date of last modification:** 18.11.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚCHV/ BFP/04/08 | **Course name:** Biochemistry of Physiological Processes |
|---|---|

**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:** 2.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**
Cellular physiology. Biochemical specialization of intracellular organelles.
Biological membranes, ion channels, membrane pumps.
Cell cycle, cell cycle regulation.
Apoptosis and regulatory mechanisms of apoptosis.
Physiology of specific organs in terms of metabolism. Muscle physiology and muscle contraction.
Liver and gallbladder physiology. Kidney physiology.
Endocrine system, importance of internal secretion, mechanism of action of hormones. The second messengers and signal-transduction pathways.

**Recommended literature:**
L.S.Costanzo, Physiology, fourth edition, 2010 Saunders, Inc, Elsevier.
S. Reed, Essential Physiological Biochemistry, 2009 John Wiley & Sons, Ltd.
B. Alberts, Molecular Biology of the Cell, sixth edition, 2002 Garland Science, Taylor & Francis Group. LLC.
Články v časopisoch.

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 132

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 41.67 | 25.76 | 15.15 | 9.85 | 7.58 | 0.0 |

**Provides:** RNDr. Nataša Tomášková, PhD., prof. RNDr. Erik Sedlák, DrSc.

**Date of last modification:** 11.11.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

**COURSE INFORMATION LETTER**

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚFV/ BIOE1/14 | **Course name:** Bioenergetics I |

**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., 4.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Exam
During an exam, a student should be able to demonstrate his/her knowledge from the parts of Bioenergetics which are involved in the brief outline of the course.

**Learning outcomes:**
To provide the introduction to the fundamental bioenergetic processes in the biological organisms. The emphasis will be on the description of the structure and function of the biomacromolecules involving in the processes of the oxidative phosphorylation. The principles of the membrane transport in the biological systems will be provide as well.

**Brief outline of the course:**
Week 1
Areas of interest of bioenergetics, its importance and position in science. Central concept of bioenergetics - chemiosmotic theory. The main sources of energy in living organisms. Processes in biological systems in which energy is consumed. Gibbs free energy. Structure and significance of adenosine triphosphate (ATP). Change in Gibbs energy during ATP hydrolysis. Reasons why ATP plays an important role in bioenergetics.
Week 2
Oxidation-reduction (redox) potential. Determination of redox potential. Influence of pH on redox potential. Relationship between Gibbs energy and redox potential. Ionic electrochemical gradient. The force of proton motion. Equilibrium distribution of ions on the membrane. Nernst potential. Donnan's equilibrium.
Week 3
Glycolysis. Glucose metabolism in different cell types. Glycolytic (Embden-Mayerhoff) path. Preparatory, cleavage and redox phase of glycolysis. Regulation of glycolysis. Regulatory enzymes in glycolysis. Post-glycolytic processes. Citrate (Krebs) cycle. Regulation of the Krebs cycle.
Week 4
Mitochondria - structure and basic functions. Mitochondrial genome. Origin of mitochondria. Respiratory chain in mitochondria. Respiratory chain components. Mechanism of electron transport in the respiratory chain. Proton transport across the inner mitochondrial membrane. Chemiosmotic proton circuit.

Weeks 5-6
NADH dehydrogenase (complex I) - structure and mechanism of functioning. Mechanism of proton pumping in NADH dehydrogenase. NADH dehydrogenase inhibitors. Succinate dehydrogenase (complex II) - structure and catalytic mechanism. Cytochrome c reductase (complex III) - structure. Mechanism of proton pumping in complex III - Q cycle. Cytochrome c oxidase (complex IV) - structure and basic functions. Catalytic mechanism of oxygen reduction and proton pumping in cytochrome c oxidase.
Week 7
ATP synthesis in mitochondria. ATP - synthase (F1- FO ATP-ase) - structure and basic functions. Mechanism of ATP synthesis. Control and regulation of ATP synthesis - thermodynamic and kinetic aspect. Uncoupling of electron transport from ATP formation. ATP synthase inhibitors. Proton transport in other ATP-ases.
Weeks 8-9
Photosynthesis - basic concepts and definitions. Chloroplasts - sites of photosynthesis. Photosystem I and photosystem II - structure and properties. Light phase of photosynthesis. Molecular mechanism of the light phase of photosynthesis. Dark phase of photosynthesis. Calvin cycle. CO2 fixation. Photosynthesis and ATP production. Evolutionary consequences of photosynthesis for the existence of life - the formation of molecular oxygen. Photosynthesis in bacteria.
Week 10
Alternative methods of creating a transmembrane proton gradient. Proton pumps. Bacteriorodopsin - structure and basic mechanisms of function. Primary sodium pumps. Classification of ion transport in biological membranes. ATP-controlled ion pumps.
Week 11
Mitochondrial aging theory. History of mitochondrial aging theory. Oxygen radical formation and oxidative stress in mitochondria. Testable predictions of mitochondrial aging theory. The possibility of extending the lifespan of biological organisms.
Week 12
Evolution of bioenergetics systems. The future of bioenergetics.

**Recommended literature:**
Literature:
1. D. Nicholls and S. Fergusson. Bioenergetics 4, Academic Press, 2013.
2. M. Wikström (Ed.). Biophysical and structural aspects of bioenergetics, The Royal Society of Chemistry, 2005.
3. D. Harris. Bioenergetics at a glance, Blackwell Science Ltd., 1995.
4. V. Saks (Ed.). Molecular system bioenergetics, Wiley-VCH, 2007.
5. I. Scheffer. Mitochondria (2nd Edition), John Wiley & Sons, Inc., 2008.
6. A.D.N.J. de Grey. The mitochondrial free radical theory of aging, R.G. Landis Company, 1999.
7. J.A.M. Smeiting, R.C.A. Sengers and J.M.F. Trijbels. Oxidative phosphorylation in health and disease, Kluwer Academic/Plenum Publisher, 2004.
8. N.W.C. Cheetham. Introducing biological energetics, Oxford University Press, 2011.
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**Course language:**
English language

**Notes:**

**Course assessment**
Total number of assessed students: 38

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 86.84 | 5.26 | 5.26 | 0.0 | 2.63 | 0.0 |

**Provides:** doc. Mgr. Daniel Jancura, PhD., RNDr. Marián Fabián, CSc.

**Date of last modification:** 17.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## 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**
Total number of assessed students: 59

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 96.61 | 3.39 | 0.0 | 0.0 | 0.0 | 0.0 |

**Provides:** RNDr. Jana Kisková, PhD.

**Date of last modification:** 01.08.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

**COURSE INFORMATION LETTER**

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/BM/22 | **Course name:** Biological membranes |
|---|---|

**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:** 2.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Written test and final exam in writing and oral form

**Learning outcomes:**
Gaining basic knowledge about the biological membranes structure, properties, and their functions. Further, obtaining the knowledge regarding physiological processes in organisms which are dependent on biological membrane functions.

**Brief outline of the course:**
Week 1 - Composition of biological membranes and their models.
Week 2 - Lipid bilayers characteristics - physical, chemical and mechanical properties.
Week 3 - Membrane microdomains and their function.
Week 4 - Biological membranes function - plasma, organelle and nuclear membrane
Week 5 - Types of transports across membranes.
Week 6 - Membrane proteins - species and their functions
Week 7 - Ion channels
Week 8 - Receptors and cell signaling.
Week 9 - Transmitters and pumps and their function in the cell.
Week 10 - Propagation of signals in the body - electrical and chemical signaling.
Week 11 - Methods for studying membranes and their properties.
Week 12 - Methods to study membrane transport.

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 4

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 25.0 | 25.0 | 50.0 | 0.0 | 0.0 | 0.0 |

**Provides:** doc. RNDr. Katarína Štroffeková, PhD.

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| **Date of last modification:** 21.09.2021 |
| **Approved:** prof. RNDr. Pavol Miškovský, DrSc. |

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ BSIM1/14 | **Course name:** Biomolecular Simulations |
|---|---|

**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., 4.

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

**Prerequisities:**

**Conditions for course completion:**
Elaboration and presentation of the project on given actual subject. Development of own computer programs on project given at the exercises. Exam. Might be substituted by written exam including Q/A part.

**Learning outcomes:**
Introduction to actual problematics of biomolecular simulations.

**Brief outline of the course:**
Structural characteristics of biological polymers. Foldamers. Central dogma of molecular biology as flow of biological information. 3D-structure and function of foldamers. Recent view on enzyme mechanisms. Experimental methods of structure determination and their limitations. Empirical force fields and methods of classical molecular dynamics. Molecular dynamics and Monte Carlo methods - algorithms and paralelization. Ab initio molecular dynamics and hybrid approaches. Computational challenges in biomolecular simulations - simulations of chemical reactions, free energy evaluation, protein folding. Computational complexity, nontraditional approaches and heuristic approaches.

**Recommended literature:**
Actual literature recommended by lecturer.

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 56

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 76.79 | 7.14 | 12.5 | 1.79 | 1.79 | 0.0 |

**Provides:** doc. RNDr. Jozef Uličný, CSc.

**Date of last modification:** 27.03.2020

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚCHV/ BOC/18 | **Course name:** Bioorganic Chemistry |
|---|---|

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

**Number of ECTS credits:** 5

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
1. Individual work and activity in seminars.
2. Passing a written exam with a success rate of min. 51%.

**Learning outcomes:**
Metodology of organic chemistry used to understanding of processes in living forms. Mechanism of the basic biochemical processes including proteosynthesis, enzymatic catalysis, nucleic acid chemistry, photosynthesis.

**Brief outline of the course:**

**Recommended literature:**
H. Dugas: Bioorganic Chemistry, Wiley, London 1995.

**Course language:**
Slovak language

**Notes:**
Teaching is carried out in person or, if necessary, online using the MS Teams or BBB (BigBlueButton) tool. The form of teaching is specified by the teacher at the beginning of the semester, updated continuously.

**Course assessment**
Total number of assessed students: 28

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 53.57 | 28.57 | 3.57 | 14.29 | 0.0 | 0.0 |

**Provides:** doc. RNDr. Ladislav Janovec, PhD., RNDr. Jana Špaková Raschmanová, PhD.

**Date of last modification:** 21.12.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ SBFc/03 | **Course name:** Biophysical Seminary |
|---|---|

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

**Number of ECTS credits:** 1

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
The active presence on the seminars.

**Learning outcomes:**
To teach students of the individual scientific work in the frame of the year's and diploma thesis and lead them to the intelligible presentation of the scientific results.

**Brief outline of the course:**
The seminar of the biophysics department oriented to the themes of the year's and diploma works.

**Recommended literature:**
The literature will be recommended by supervisors of the theses.

**Course language:**
English language

**Notes:**

**Course assessment**
Total number of assessed students: 19

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

**Provides:** doc. Mgr. Daniel Jancura, PhD.

**Date of last modification:** 17.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ SBFd/03 | **Course name:** Biophysical Seminary |
|---|---|

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

**Number of ECTS credits:** 1

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
The active presence on the seminars.

**Learning outcomes:**
To teach students of the individual scientific work in the frame of the year's and diploma thesis and lead them to the intelligible presentation of the scientific results.

**Brief outline of the course:**
The seminar of the biophysics department oriented to the themes of the year's and diploma works.

**Recommended literature:**
The literature will be recommended by supervisors of the theses.

**Course language:**
English language

**Notes:**

**Course assessment**
Total number of assessed students: 19

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

**Provides:** doc. Mgr. Daniel Jancura, PhD.

**Date of last modification:** 17.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ SBFe/03 | **Course name:** Biophysical Seminary |
|---|---|

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

**Number of ECTS credits:** 1

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
The active presence on the seminars.

**Learning outcomes:**
To teach students of the individual scientific work in the frame of the year's and diploma thesis and lead them to the intelligible presentation of the scientific results.

**Brief outline of the course:**
The seminar of the biophysics department oriented to the themes of the year's and diploma works.

**Recommended literature:**
The literature will be recommended by supervisors of the theses.

**Course language:**
English language

**Notes:**

**Course assessment**
Total number of assessed students: 12

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

**Provides:** doc. Mgr. Daniel Jancura, PhD.

**Date of last modification:** 17.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ SBFf/03 | **Course name:** Biophysical Seminary |
|---|---|

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

**Number of ECTS credits:** 1

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
The active presence on the seminars.

**Learning outcomes:**
To teach students of the individual scientific work in the frame of the year's and diploma thesis and lead them to the intelligible presentation of the scientific results.

**Brief outline of the course:**
The seminar of the biophysics department oriented to the themes of the year's and diploma works.

**Recommended literature:**
The literature will be recommended by supervisors of the theses.

**Course language:**
English 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. Mgr. Daniel Jancura, PhD.

**Date of last modification:** 17.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/MSSBF/14 | **Course name:** Biophysics |
|---|---|

**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:** ÚFV/CHV1/03 and ÚFV/PSF/22 and ÚFV/FChFB/22 and ÚFV/FOT/14 and ÚFV/BIOE1/14

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 17

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 35.29 | 29.41 | 29.41 | 5.88 | 0.0 | 0.0 |

**Provides:**

**Date of last modification:** 11.08.2023

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ BFB1/14 | **Course name:** Cell Biophysics I |
|---|---|

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

**Number of ECTS credits:** 4

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

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

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 31

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 45.16 | 22.58 | 12.9 | 19.35 | 0.0 | 0.0 |

**Provides:** doc. RNDr. Katarína Štroffeková, PhD., RNDr. Gabriela Fabriciová, PhD.

**Date of last modification:** 18.09.2023

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

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

**Number of ECTS credits:** 2

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

**Course level:** II.

**Prerequisities:**

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

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

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

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

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 281

| abs | n | z |
|---|---|---|
| 98.22 | 1.78 | 0.0 |

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

**Date of last modification:** 31.07.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚCHV/VMS1/03 | **Course name:** Computing Methods in X-Ray Structure Analysis |
|---|---|

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

**Number of ECTS credits:** 2

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

**Course level:** II.

**Prerequisities:** ÚCHV/STA1/03

**Conditions for course completion:**
Semester project - student has to solve and describe a crystal structure of unknown sample.

**Learning outcomes:**
Crystal structure analysis of simple samples, tabular and graphical processing of the results.

**Brief outline of the course:**
Practical course of crystal structures solution for substances with the number of atoms less than 200 since the data processing to publishing structures: selection of the correct space group and generate the necessary files for the structure solution (Wingx); search for the model of the structure (SHELX and SUPERFLIP), refinement of the model (SHELX); graphical representation of the structure (DIAMOND); calculations of bond lengths, angles and hydrogen bonds (PARST); tabulation of the results of crystal structure analysis, obtaining the necessary data for similar structures from the Cambridge Structural Database System. Processing of results of powder diffraction technique, modeling of powder diffraction patterns (MERCURY).

**Recommended literature:**
Manuals for the programs.

**Course language:**
Slovak and English

**Notes:**
Teaching is carried out in person or, if necessary, online using the MS Teams tool. The form of teaching is specified by the teacher at the beginning of the semester, updated continuously.

**Course assessment**
Total number of assessed students: 78

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 83.33 | 8.97 | 2.56 | 5.13 | 0.0 | 0.0 |

**Provides:** doc. RNDr. Ivan Potočňák, PhD.

**Date of last modification:** 21.07.2022

| |
|---|
| **Approved:** prof. RNDr. Pavol Miškovský, DrSc. |

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/DPO/14 | **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:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**

**Course language:**

**Notes:**

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

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 70.42 | 19.72 | 5.63 | 1.41 | 2.82 | 0.0 |

**Provides:**

**Date of last modification:** 07.12.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

**COURSE INFORMATION LETTER**

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚCHV/ ENZ/04 | **Course name:** Enzymology |

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

**Number of ECTS credits:** 5

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Successful completion of the exam, which consists of two parts: (i) written and (ii) oral part. The student passes the exam if s/he obtains at least 60% of the points in the written part and at the same time adequately answers the asked questions in the oral part.

**Learning outcomes:**
Understand the principle of enzyme catalysis. Learn to use the basic equations of enzyme kinetics. Ability to determine the basic kinetic and thermodynamic parameters of the enzyme-catalyzed reaction from experimental measurements.

**Brief outline of the course:**
1. Introduction. Chemical catalysis – theory of transition state.
2. Enzyme catalysis - types and examples.
3. Cofactors. Active site - lock and key, induced fit. Enzymes - classification.
4. 3D structure of proteins. Noncovalent interactions. Secondary, tertiary and quaternary structures. Convergent and divergent evolution. Multienzyme complexes. Dyanmics of proteins.
5. Ligand binding. Thermodynamics and konetics. Techniques.
6. Chemical kinetics. Basic equations of enzyme kinetics.
7. Regulations of enzyme activity - examples.
8. Conformational change, allosteric regulation. Regulation of metabolic pathways.
9. Experimental determination of enzyme activity. pH and temperature dependence of enzyme catalysis.
10. Determination of individual rate constants. Stop flow. Enzyme-substrate complementarities and the use of binding energy in enzyme catalysis.
11. Reversible inhibition.
12. Irreversible inhibition.
13. Specificity and control mechanisms. „Moonlighting“ enzymes. Applications of enzymes (organic solvents). Catalytic antibodies. Extremophiles. Directed selection of enzymes. Enzymatic reactions with multiple substrates.

**Recommended literature:**
T.E. Creighton: Proteins - structures and molecular properties, 1993, W.H. Freeman and Company - New York.

Alan Fersht “Structure and Mechanism in Protein Science: A Guide to Enzyme Catalysis and Protein Folding. “ (3rd Ed. W. H. Freeman and Company, 1999)
Robert A. Copeland: Enzymes (2nd edition), Wiley-VCH, 2000.

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 168

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 37.5 | 22.62 | 16.67 | 14.29 | 8.33 | 0.6 |

**Provides:** prof. RNDr. Erik Sedlák, DrSc.

**Date of last modification:** 14.11.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ EMBF/14 | **Course name:** Experimental Methods of Biophysics |
|---|---|

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

**Number of ECTS credits:** 4

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**
1. J.E. Landbury and B.Z. Chowdhry, Biocalorimetry: Application of calorimetry in the biological sciences, Wiley, 1998
2. Alice L. Givan: Flow Cytometry, first principles, second edition, Wiley, 2001
3. Joseph R. Lakowicz: Principles of Fluorescence Spectroscopy, Third edition, Springer 2006
4. Ewa M. Goldys: Fluorescence Applications in Biotechnology and the Life Sciences, 2009, Wiley-Blackwell

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 14

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 64.29 | 21.43 | 7.14 | 7.14 | 0.0 | 0.0 |

**Provides:** doc. RNDr. Katarína Štroffeková, PhD., prof. RNDr. Erik Sedlák, DrSc., RNDr. Gabriela Fabriciová, PhD., RNDr. Marián Fabián, CSc.

**Date of last modification:** 25.02.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

**COURSE INFORMATION LETTER**

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚFV/ ZBMB/14 | **Course name:** Fundamentals of Cellular and Molecular Biology |

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

**Number of ECTS credits:** 5

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Exam.
Student is able to demonstrate knowledge in the field of cellular and molecular biology, is able to promptly answers asked questions and design a simple experiment focused on monitoring of intracellular events.

**Learning outcomes:**
The aim of the course is to provide an overview in the field of cell and molecular biology. Emphasis is placed on the functions of intracellular compartments and cell signaling. Exercises are focused on working with cell cultures, preparation of solutions and samples for microscopy and cytometry.

**Brief outline of the course:**
1. week
Chemical composition of the living and inanimate world. Chemical composition of the cell (chemical bonds, water, molecules and macromolecules in cells) Cell - the basic structural and functional unit of a living organism. Light, fluorescence and electron microscopy, cell fractionation.
2. week
Catalysis and energy utilization (synthesis and oxidation of organic molecules, electron transporters, ATP). Degradation of sugars and fats (fermentation, glycolysis, oxidative phosphorylation)
3. week
Information macromolecules (proteins and nucleic acids). Shape, structure and functions of proteins. Structure and function of DNA. DNA replication. Mutations and their significance. DNA repair.
4. week
Chromosomes (nucleus, organization of DNA in interphase, nucleosomes as a basic structural units of chromatin, condensation of chromosomes). Cell division (mitosis, meiosis).
5. week
Expression of genetic information. Transfer of information from DNA to protein. Structure and function of RNA (mRNA, tRNA, rRNA, small RNA molecules). Transcription. Regulation of gene expression (DNA-binding proteins, RNA polymerase and transcription factors).
6. week

Membrane structure. Lipid bilayer (fluidity and asymmetry of lipid membranes). Membrane proteins and their importance. Plasma membrane and cell surfaces. Transport of substances across membranes (passive transport, active transport, transporters, ion channels, membrane potential, signal transmission in nerve cells.
7. week
Energy acquisition in mitochondria and chloroplasts. Mitochondrial membranes and oxidative phosphorylation. Electron transport and cellular respiration. Chloroplasts (structure and function). Photosynthesis. DNA in mitochondria and chloroplasts.
8. week
Intracellular compartments and transport of substances. Membrane organelles (structure and functions). Protein sorting, vesicular transport, secretory pathways and endocytosis.
9. week
Cell communication (general principles of cell signaling, signaling molecules, messengers, receptors on membranes, intracellular signaling cascades). G-protein coupled receptors. Receptors associated with enzymes (tyrosine kinases).
10. week
Cytoskeleton. Intermediate filaments. Microtubules (centrosome, molecular motors and intracellular transport). Actin fibers (actin-myosin, cell movement).
11. week
Cell division. Cell cycle. Cell cycle control (cyclins and cyclin-dependent kinases). Regulation of cell number and cell death (types of cell death). Disorders of cell cycle control, carcinogenesis.
12. week
Cell differentiation and aging.

**Recommended literature:**

1. K. Kapeller, H. Strakele, Cytomorfológia, Osveta, Martin 1999.
2. G. M. Cooper, The cell a molecular approach, ASM Press, Washington 2000.
3. J. D. Watson, molekulární biologie genu, Acadenie, Praha 1982.
4. J. Darnell, H. Lodish, D. Baltimore: Molecular Cell Biology, W. H. Freeman and Co., New York 1990. 5. S. Rosypal, Úvod do molekulární biologie I, II, III, Brno 1997.

**Course language:**

**Notes:**

**Course assessment**

Total number of assessed students: 33

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 60.61 | 27.27 | 6.06 | 0.0 | 6.06 | 0.0 |

**Provides:** prof. RNDr. Pavol Miškovský, DrSc., RNDr. Zuzana Naďová, PhD.

**Date of last modification:** 21.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/FEB/22 | **Course name:** Fyziológia eukaryotických buniek - zvieracie a bunkové modely ľudských ochorení |
|---|---|

**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:** 2., 4.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Written tests during the semester and final written and oral examination

**Learning outcomes:**
To get familiar with the models of human diseases used at the cellular and whole organism level.

**Brief outline of the course:**
Week 1 - Using animal models of human disease - why it's important.
Week 2 - Types of animal models - small animals - mice, rats
Week 3 - Types of animal models - primates
Week 4 - Types of animal models - Drosophila insects, Zebra fish
Week 5 - Use of different cell types as models for human diseases.
Week 6 - Transport across cell membranes - diseases caused by disorders of transport across ion channels.
Week 7 - Models of diseases caused by disorders of transport through ion channels - at the level of cells and whole organisms.
Week 8 - Cell metabolism - diseases caused by disorders of metabolic pathways.
Week 9 - Cell metabolism - diseases caused by disorders of metabolic pathways - models at the level of cells and animals.
Week 10 - Auoimmune and degenerative disorders - cell and animal models.
Week 11 - Organoids - as models at the level of organs and tissues.
Week 12 - Molecular models of disease - Artificial intelligence modeling

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 1

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

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| **Provides:** doc. RNDr. Katarína Štroffeková, PhD., RNDr. Veronika Huntošová, PhD. |
| **Date of last modification:** 21.09.2021 |
| **Approved:** prof. RNDr. Pavol Miškovský, DrSc. |

## 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: 236

| A | B | C | D | E | FX | N | P |
|---|---|---|---|---|---|---|---|
| 56.36 | 22.88 | 8.9 | 3.39 | 1.69 | 0.42 | 0.0 | 6.36 |

**Provides:** doc. RNDr. Peter Pristaš, CSc., RNDr. Mariana Kolesárová, PhD., RNDr. Mária Piknová, PhD., RNDr. Lenka Maliničová, PhD.

**Date of last modification:** 23.06.2022

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|---|
| **Approved:** prof. RNDr. Pavol Miškovský, DrSc. |

## COURSE INFORMATION LETTER

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|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚFV/ UKF/22 | **Course name:** Introductory Medical Physics |

**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:** 3.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
1. Attendance at seminars (also applies to the online form of Teaching). A student's excused absence for a maximum of two seminars will be excused without the need for an alternative term. In the case of long-term justified absence (e.g. due to sick leave), the teacher will assign the student a substitute form of mastering the missed content.
2. Successful completion of the exam.

**Learning outcomes:**
The course provides students with the theoretical basis for the work of a medical physicist. The student should know the physical principles of application of ionizing radiation in medicine - in radiodiagnostics, nuclear medicine, radiotherapy and the principles of radiation protection.

**Brief outline of the course:**
1. Competencies of medical physicists in radiation oncology, nuclear medicine and radiodiagnostics.
2. Ionizing radiation sources used in medicine - radionuclides and generators.
3. Interactions of photon, electron, proton and heavy ions with matter. Interaction of ionizing radiation with organisms.
4. Ionizing radiation detection and measurement of the absorbed dose in medicine. Quantities and units used in medical dosimetry.
5. Radiofrequency linear accelerators. Proton accelerators and heavy ion accelerators for radiotherapy.
6. Overview of radiation treatment techniques (3D CRT, IMRT, SRS, SABR, TBI, RMM, gating). Imaging methods in radiotherapy.
7. Linear accelerator quality control systems.
8. Physical principles of brachytherapy application.
9. Treatment planning systems for radiotherapy. Information and verification systems in radiation oncology.
10. Imaging methods in radiodiagnostics and nuclear medicine.
11. Radiobiological models for predicting the effect of ionizing radiation.
12. Principles of radiation protection and current legislation.

**Recommended literature:**

1. Podorsak E.B..et al.: Radiation Oncology Physics , IAEA, 2005
2. Khan F. M.: The Physics of Radiation Therapy, Lippincott Williams & Wilkins, 2009
3. Šlampa P., Petera J.: Radiační onkológie, Galen Karolinum Praha 2007
4. Hirohiko T., et al.: Carbon-Ion Radiotherapy, Springer, 2014
5. Bushberg J. T., et al.: The Essential Physics of Medical Imaging, Wolters Kluwer, 2020
6. Lancaster J.L., Hasegawa B.1: Fundamental Mathematics And Physics Of Medical Imaging, CRC Press, 2016
7. Platná legislatíva SR (Zák.č. 87/2018 Z.z., vyhláška MZ SR č. 99/2018 Z.z., vyhláška MZ SR č. 101/2018 Z.z.)

**Course language:**

**Notes:**

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

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

**Provides:** RNDr. Martin Jasenčak, PhD.

**Date of last modification:** 18.11.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ KPBS/22 | **Course name:** Kinetické procesy v biologických systémoch |
|---|---|

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

**Number of ECTS credits:** 4

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Exam consisting of a written and an verbal part.
The student should demonstrate in the exam to demonstrate considerable knowledge of a wide range of subjects listed in the brief syllabus of the course and should be able to apply the acquired knowledge in experimental biophysics

**Learning outcomes:**
Basic knowledge of kinetics, kinetic analysis of biological processes at the molecular level, and experimental methods, emphasizing experimental examples of the use of acquired knowledge in development and research.

**Brief outline of the course:**

**Recommended literature:**

**Course language:**
slovak, english

**Notes:**

**Course assessment**
Total number of assessed students: 0

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

**Provides:** doc. RNDr. Gabriel Žoldák, DrSc.

**Date of last modification:** 17.10.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/MP/22 | **Course name:** Magisterská práca |
|---|---|

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

**Number of ECTS credits:** 6

**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: 4

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

**Provides:**

**Date of last modification:** 13.09.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/MPFM/22 | **Course name:** Matematický popis fyzikálnych modelov |
|---|---|

**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.

**Prerequisities:**

**Conditions for course completion:**
1. preparation and presentation of the selected publication 2. oral examination

**Learning outcomes:**
Introduction to mathematical description of physical models describing experimental measurements of thermal stability, enzyme catalysis, ligand binding. Use of machine learning to solve biological problems.

**Brief outline of the course:**
1. Binding of ligands to macromolecules 2. Michaelis-Menten model 3. Equilibrium thermal denaturation of proteins and nucleic acids 4. Equilibrium chemical denaturation of proteins and nucleic acids 5. Non-equilibrium thermal denaturation of proteins and nucleic acids 6. Protein aggregation 7. Kinetic modeling of biological processes 8. Introduction to machine learning 9. Principal Component Analysis 10. Linear discriminant analysis 11. Logistic regression and SVM 12. Deep learning and computer vision (convolutional neural networks)

**Recommended literature:**

**Course language:**
Slovak, English

**Notes:**

**Course assessment**
Total number of assessed students: 0

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

**Provides:** doc. RNDr. Gabriel Žoldák, DrSc., Mgr. Andrej Hovan, PhD.

**Date of last modification:** 04.07.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 2

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

**Course level:** II.

**Prerequisities:**

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

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

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

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

**Course language:**
Slovak

**Notes:**

**Course assessment**
Total number of assessed students: 6

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

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

**Date of last modification:** 01.02.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚFV/ MOS/14 | **Course name:** Methods of Optical Spectroscopy |
| **Course type, scope and the method:**<br>**Course type:** Lecture<br>**Recommended course-load (hours):**<br>**Per week:** 3 **Per study period:** 42<br>**Course method:** present | |
| **Number of ECTS credits:** 5 | |
| **Recommended semester/trimester of the course:** 1. | |
| **Course level:** II. | |
| **Prerequisities:** | |
| **Conditions for course completion:**<br>Exam. | |
| **Learning outcomes:**<br>Basic knowledge of optical spectroscopy for biophysical applications. | |
| **Brief outline of the course:**<br>Theory of light-matter interactions. Molecular motions and the corresponding spectra – Born-Oppenheimer approximation, general scheme of transitions in complicated organic molecules. Probability of spontaneous and stimulated transitions. Basic scheme of an optical spectroscopic apparatus. Infrared spectroscopy (vibrations of diatomic and polyatomic molecules, anharmonicity of vibrations, characteristic vibrations, experimental methods of infrared spectroscopy, biophysical applications of infrared spectroscopy). Raman scattering (physical principles, experimental arrangements, biophysical applications). Electronic spectroscopy (electron states of diatomic and polyatomic molecules – electronic spectra, Franck-Condom principle, polarization of electronic spectra, experimental arrangements, biophysical applications). Emission spectroscopy (luminescence quantum yield and intensity, lifetime of excited states, experimental arrangements, biophysical applications). | |
| **Recommended literature:**<br>1. Biophysics, Springer-Verlag, Heidelberg 1983.<br>2. J. Michael Hollas: Modern Spectroscopy, forth editionJohn Wiley, England 2004<br>3. P. Miškovský a kol., Praktikum k experimentálnym metódam biofyziky I, skriptum PF UPJŠ Košice 1989.<br>4. V. Prosser a kol., Experimentální metody biofyziky, Academia, Praha 1989.<br>5. P. Atkins, J. de Paula, Physical Chemistry, Oxford University Press, New York 2002. | |
| **Course language:** | |
| **Notes:** | |

**Course assessment**
Total number of assessed students: 29

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 20.69 | 27.59 | 44.83 | 3.45 | 3.45 | 0.0 |

**Provides:** prof. RNDr. Pavol Miškovský, DrSc.

**Date of last modification:** 30.03.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ MBF1/14 | **Course name:** Molecular Biophysics I |
|---|---|

**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:** 2.

**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: 33

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 57.58 | 27.27 | 12.12 | 0.0 | 3.03 | 0.0 |

**Provides:** doc. Mgr. Daniel Jancura, PhD., RNDr. Gabriela Fabriciová, PhD.

**Date of last modification:** 24.11.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ CHV1/03 | **Course name:** Molecular Structure and Chemical Bonding |
|---|---|

**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 the project - characterization of the chosen molecule using methods mentioned in the course. Exam. Written form, including Q/A part allowed due to corona-virus measures.

**Learning outcomes:**
Attendees will learn actual methods used for computer simulations of molecules. By using practical examples he/she will get hands-on experience with standart methods.

**Brief outline of the course:**
Born-Oppenheimer approximation. Methods and approaches of classical molecular mechanics. Force fields and force constants for polyatomic simulations. Force fields for biomolecular simulations (CHARMM, AMBER, MM2-4, MMFF, CVFF,...). Independent electron approximation. Hartree-Fock self-consistent field method. Post Hartee-Fock methods. Density functional theory (DFT) - basic principles and implementation. LSDA approximation and gradient corrected methods. Hybrid methods. Wavefunction and electron density analysis. Limits and perspectives of classical and quantum molecular mechanics. Alternativ methods. Ab initio computations and experimental observables. Experimental and computational observables. Molecular dynamics and stochastic methods. Integration algorithms. Car-Parinello dynamics.

**Recommended literature:**
1. Leech: Molecular Modeling: Principles and Applications, Longmann, 1996.
2. M.P. Allen, D.J. Tildesley: Computer Simulation of Liquids, Oxford University Press, 1989.
3. Polák, Zahradník: Kvantová chemie, SNTL/Alfa , 1985.
4. P. W. Atkins, R. S. Friedman: Molecular Quantum Mechanics.Oxford University Press, 1997

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 52

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 63.46 | 21.15 | 11.54 | 3.85 | 0.0 | 0.0 |

| |
|---|
| **Provides:** doc. RNDr. Jozef Uličný, CSc. |
| **Date of last modification:** 08.09.2021 |
| **Approved:** prof. RNDr. Pavol Miškovský, DrSc. |

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ NTM/22 | **Course name:** Nanotechnológie v biomedicíne |
|---|---|

**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:** 3.

**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: 1

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

**Provides:** prof. RNDr. Pavol Miškovský, DrSc.

**Date of last modification:** 13.11.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ NSF/10 | **Course name:** Non-Equilibrium Statistical Physics |
|---|---|

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

**Number of ECTS credits:** 5

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**
To give basic knowledges about modern trends and theoretical methods in description of non-equlibrium phenomena in physics.

**Brief outline of the course:**
Problems of kinetic theory - formulations of basic tasks. Distribution function. Liouville theorem. Liouville operator. Kinetic Boltzman equation. H-theorem. Maxwell distribution. Transport phenomena. Conservation laws. Derivation of the macroscopic eduqtions in leading and next-to-leading approximation. Hydrodynamic approximation. Set of equations for density, mean velocity and temperature. Derivation of continuity equation, Navier-Stokes equation, heat conductivity equation. Derivation of vicosity and diffusivity coefficients from microscopic description. Stokes laws. Reynolds number. Dynamical derivation of kinetic equation. Liouville (master) equation for N-particle distribution function. Bogolyubov set of equations for distribution functions.
Principle of weakening of statistical correlations. Equation for one-particle distribution function. Brown motion. Langevin equation. Fokker-Planck equation and specific tasks.

**Recommended literature:**
1. Landau L.D., Lifshitz E.M.: Teoreticheskaja fizika X: Lifshitz E.M., Pitaevskij L.P.: Fizicheskaja
kinetika, Moskva, Fizmatlit 2002
2. K. Huang: Statistical mechanics, John Wiley and Sons, Inc., New York-London, 1963.
D.N.Zubarev: Neravnovesnaja statisticheskaja termodinamika, Moskva, Nauka, 1971.
A.N.Vasiliev Kvantovopolevaja renormgruppa v teorii kriticeskogo povedenija i stochasticeskoj dinamike, Sankt-Peterburg, Izd. Peters. Inst. Of. Nuclear physics (1998) 773 (The Field Theoretic Renormalization Group in Critical Behavior Theory and Stochastic Dynamics, Chapman & Hall CRS Press Company New York, 2004)

**Course language:**
slovak and english

**Notes:**

**Course assessment**
Total number of assessed students: 28

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 64.29 | 7.14 | 17.86 | 10.71 | 0.0 | 0.0 |

**Provides:** prof. RNDr. Michal Hnatič, DrSc., RNDr. Tomáš Lučivjanský, PhD., univerzitný docent

**Date of last modification:** 18.11.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚFV/ NOT1a/03 | **Course name:** Nontraditional Optimization Techniques I |

**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., 3.

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

**Prerequisities:**

**Conditions for course completion:**
Oral examination (50%), results and quality of the
personal presentation of the projects (50%).
Monitoring progress in solving applied projects. From given set of problems, the student must pick 1 to 3 projects and develop functioning implementation of the solution in form of computer program. In case of more challenging problems, collaborative work of students is acceptable, but each student must be able to present her/his individual contribution.

**Learning outcomes:**
To familiarize students with biologically and physically inspired optimization, simulation and prediction techniques. To expand students' creativity and programming skills by applying heuristic techniques in solving applied problems.
Upon successful completion of course, student shall possess knowledge about most typical non-traditional optimization techniques, as well as practical experience of solving concrete problems.

**Brief outline of the course:**
1. Fundamentals terms and definitions of optimization theory. Physical laws as optimization tasks. Variational principle.
2. Model optimization problems. Basic types of objective functions. Classification of optimization methods. Computational scaling of optimization methods. Big O notation. Parallelization, Metcalf's law, Amdahl's bottleneck.
3. Exhaustive search, Gradient-based optimization techniques.
4. Evolutionary algorithms. Canonical Genetic algorithm. Genetic algorithms as Markov processes. Statistical Mechanics description of Genetic Algorithms.
5. Monte Carlo simulation and simulated annealing. Metropolis algorithm and statistics of sampling in solution space.
6. Swarm optimization. Ant algorithms.
7. Cellular Automata and their applications in simulations of complex systems.
8. data structures and representation of solution space and optimization problems. Compression of information and symmetry. Manifolds.
9. Generators. grammars and languages. Genetic programming. AST and operations on AST representation of programs.

10. Fractals. Lindenmayer systems. Life-like and agent-based models.
11. Evolutionary games. Evolution of cooperation.
12. Fundamentals of Neural Networks. Stochastic gradient optimization.

**Recommended literature:**

Hartmann, A. K., Rieger, H., Optimization Algorithms in Physics, Wiley, 2002
Reeves, C. R., Rowe, J. E., Genetic Algorithms: Principles and perspectives, Kluwer, 2003
Mitchell, M., Complexity. A Guided Tour, Oxford University Press, 2009
Solé, R. V., Phase Transitions, Princeton University Press, 2011
Ilachinski, A., Cellular Automata. A Discrete universe, World Scientific, 2002
Haykin, S., Neural Networks. A Comprehensive Foundation, Prentice-Hall, 1999
Actual literature and data related to problem sets

**Course language:**

English language is essential for students as "lingua franca" for the latest advancements and applications of optimization techniques.

**Notes:**

The subject is taught using direct contact form. Should the epidemiological situation (or other relevant circumstances) mandate, the distant form will be used, preferentially using MS Teams learning environment.

**Course assessment**

Total number of assessed students: 99

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 69.7 | 18.18 | 7.07 | 2.02 | 3.03 | 0.0 |

**Provides:** doc. RNDr. Jozef Uličný, CSc.

**Date of last modification:** 22.11.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ NOT1b/03 | **Course name:** Nontraditional Optimization Techniques II |
|---|---|

**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., 4.

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

**Prerequisities:**

**Conditions for course completion:**
Presentation of the project in written form. Oral exam and discussion of the presented project. Should corona-virus quarantine persist, written report and answer to posed questions suffice.

**Learning outcomes:**
By using examples from the biology to learn applications of optimization techniques on study and interpretation of complex systems. Introduction to new paradigms in the area of systems biology, including parasite/host coevolution.

**Brief outline of the course:**
Complex systems, emergent behavior. Evolutionary theory and memetics. Application of optimization techniques on complex systems. Application of methods /genetic algorithms, simulated annealing, taboo search/ on selected problems of biomolecular simulations. Molecular dynamics, protein folding. Population dynamics, metabolic networks and complexity in bioinformatics.

**Recommended literature:**
The actual scientific papers.

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 61

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 86.89 | 6.56 | 4.92 | 1.64 | 0.0 | 0.0 |

**Provides:** doc. RNDr. Jozef Uličný, CSc.

**Date of last modification:** 08.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚCHV/ NKF/22 | **Course name:** Nucleic Acids - Structure and Function |
|---|---|

**Course type, scope and the method:**
**Course type:** Lecture / Practice
**Recommended course-load (hours):**
**Per week:** 3 / 0 **Per study period:** 42 / 0
**Course method:** present

**Number of ECTS credits:** 4

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Participation in lectures (also by distance learning).
The lecturer conducting the lecture/seminar will excuse the justified absence of the student (sickness, family reasons, etc.) at a maximum of two lectures/seminars during the semester without the need for a substitute. In the event of longer-term justified absence (e.g. due to sickness), the student must provide evidence of mastery of the missed course content by means of an agreed substitute; oral examination

**Learning outcomes:**

**Brief outline of the course:**
Cell signaling system. Molecular basis of neoplastic cell transformation leading to development of cancer - oncogenes, tumor suppressing genes, regulatory regions of DNA. Gene mutations and DNA repair mechanisms. Induced pluripotent stem cells.
Current trends and advances in the study of nucleic acids, their biological significance in cell metabolism. Gene therapy. Gene editing. Gene silencing.
The classification of viruses based on genetic material, the effect of physical and chemical factors on viruses. Biochemistry of viruses. Virus replication. Viral oncogenicity. Retroviruses and HIV. Pandemic viruses - Covid, SARS, MERS, Ebola, influenza papillomaviruses.
Prions. Aptamers and nanobioconjugates.
Molecular basis of the manifestation of genetically determined diseases and their detection and diagnostic.

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 4

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

| |
|---|
| **Provides:** doc. RNDr. Viktor Víglaský, PhD. |
| **Date of last modification:** 18.01.2022 |
| **Approved:** prof. RNDr. Pavol Miškovský, DrSc. |

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ FPK1/07 | **Course name:** Phase Transitions and Critical Phenomena |
|---|---|

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

**Number of ECTS credits:** 4

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
To successfully complete the course, the student is required to understand the concept of phase transitions and critical phenomena based on thermodynamics and statistical physics. The successful graduate will be able to apply this apparatus to simpler models of magnetic systems using exact or approximate methods. The condition for obtaining credits is successful completion of the final oral exam. The credit evaluation of the course takes into account the following student workload: direct teaching (2 credits), self-study (1 credit), and assessment (1 credit). The minimum limit for completing the course is to obtain at least 50% of the total score, using the following rating scale: A (90-100%), B (80-89%), C (70-79%), D (60- 69%), E (50-59%), F (0-49%).

**Learning outcomes:**
To acquaint students with the basic problems of the theory of phase transitions and critical phenomena and their solutions using the methods of thermodynamics and statistical physics. Emphasis is placed on the study of phase transitions in magnetic systems, through several theoretical models, but the course also covers other areas such as phase transitions in nuclear matter.

**Brief outline of the course:**
1. Thermodynamics and phase transitions.
2. Conditions of stability of the equilibrium state of the magnetic system.
3. Phase equilibrium, phase transitions. Clausius-Clapeyron equation.
4. Classical (Ehrenfest) classification of phase transitions: phase transitions of the first and second kind.
5. Landau's description of phase transitions of the second kind.
6. Critical indices, universality. Definition of critical indices for the magnetic system. Thermodynamic relations between critical indices.
7. Basic microscopic models of magnetic phase transitions. Heisenberg and Ising model.
8. Exact solutions of microscopic models: one-dimensional and two-dimensional Ising model.
9. Thermodynamic functions for a one-dimensional Ising model.
10. Some approximate methods of solving the Ising model.
11. Landau's theory of phase transitions.
12. Phases of nuclear matter.

**Recommended literature:**

Basic literature:
BOBÁK, A., Phase Transitions and Critical Phenomena, Project 2005/NP1-051 11230100466, European Social Fund, Košice 2007.
STANLEY, H.G.: Introduction to Phase Transitions and Critical Phenomena, Clarendon Press Oxford, 1971.
Other literature:
REICHL, L.E.: A Modern Course in Statistical Physics, University of Texas Press, Austin, 1980.
PLISCHKE, M., BERGERSEN, B.: Equilibrium Statistical Physics, World Scientific, 1994.
KADANOFF, L.P.: Statistical Physics, Statistics, Dynamics and Renormalization, World Scientific, 2000.

**Course language:**
1. Slovak,
2. English

**Notes:**
The course is realized in the presence form, if necessary remotely in the MS Teams environment.

**Course assessment**
Total number of assessed students: 137

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 54.74 | 11.68 | 11.68 | 14.6 | 7.3 | 0.0 |

**Provides:** prof. RNDr. Milan Žukovič, PhD.

**Date of last modification:** 19.11.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 2

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 0

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

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

**Date of last modification:** 01.02.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ FChFB/22 | **Course name:** Photochemistry and photobiology |
|---|---|

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

**Number of ECTS credits:** 5

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Presentation, test, oral exam.
The student will be able to present the knowledge acquired in the areas described in the note. Skills acquired in photochemistry and photobiology may be presented in the form of an oral presentation.

**Learning outcomes:**
Introduction to the problems of interaction of light with biological systems, in particular the role of light-activated molecules in biology and medicine. Description of relevant spectral, photochemical, and photobiological concepts used in the field. In addition to basic knowledge of photochemistry and photobiology, students will become familiar with the methods and detection systems used in this field. Applications will be focused on light-activated therapy. Students will be trained in the fundamentals of photodynamic therapy.

**Brief outline of the course:**
Lectures:
1. tissue optics - basic parameters describing the application of light in the detection of changes in tissue.
2. Detection and application of endogenous and exogenous fluorophores - definition of light sensitive molecule, difference between endo- and exo-fluorophores and intra- and extracellular processes.
3. Photophysics - description of processes active in photoreaction. Formation of reactive oxygen species in solution.
4. photochemistry - chemical changes in fluorophore and environment during photoreaction. The ability to detect these changes in steady state and time resolved measurements.
5. the application of luminescent probes to measure tissue oxygenation, acidification and oxidative stress in tissue by spectroscopic and microscopic techniques.
6. processes of light application in cells - influence of these processes on subcellular organelles.
7. cell death as a consequence of photoreaction - description of selected parameters active in signaling pathways leading to apoptosis, necrosis and autophagy.
8. photodynamic therapy - mechanism and basic principles of treatment at the cellular level.
9. application of protoporfyrin IX in photodetection of tissue oxygenation and cancer detection.

10. Application of phototherapy and photodiagnostics in cancer and non-cancerous diseases in the clinic.
11. Singlet oxygen - production and detection of singlet oxygen, application in practice.
12. Organometallic complexes - photoreaction in solar cells, application in practice.
Training in phototreatment and photodetection using spectrofluorimeters, fluorescence and absorbance readers for detection of metabolic changes in cells, flow cytometer for analysis of oxidative stress in cells, photodynamic therapy in cell cultures and tissues. Simulation of photodynamic therapy in ovo.
Presentation: oral presentation of new trends in photophysics, photochemistry and photobiology.

**Recommended literature:**
Mycek & Pogue, "Handbook of Biomedical Fluorescence", Dekker, 2003. R. Splinter & B.A. Hooper, "An introduction to Biomedical Optics", Taylor&Francis, 2007. Lakowicz, “Principles of fluorescence spectroscopy“, Springer 2006. Muzykantov & Torchilin, “Biomedical aspects of drug targeting“, Kluwer Academic Publishers 2002

**Course language:**
Slovak, English

**Notes:**

**Course assessment**
Total number of assessed students: 6

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 83.33 | 16.67 | 0.0 | 0.0 | 0.0 | 0.0 |

**Provides:** RNDr. Veronika Huntošová, PhD.

**Date of last modification:** 24.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚFV/ FOT/14 | **Course name:** Photonics |

**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.

**Prerequisities:**

**Conditions for course completion:**
Oral exam where the students present theoretical knowledge of topics listed in the course syllabus and demonstrate the ability to find connections between the different areas of photonics and optics.

**Learning outcomes:**
Students completing the course will gain basic knowledge in the field of photonics with a focus on the practical use of optical phenomena for scientific purposes. Students will also get an overview of optical components and equipment that are used in photonic and/or laser experiments.

**Brief outline of the course:**
1. Ray optics.
2. Wave optics.
3. Beam optics.
4. Electromagnetic optics.
5. Polarization optics.
6. Photon optics.
7. Resonator optics.
8. Laser amplifiers.
9. Lasers.
10. Optical devices: acousto-optics.
11. Optical devices: electro-optics.
12. The basics of non-linear optics.

**Recommended literature:**
1. B. E. A. Saleh, M. C. Teich, Fundamentals of Photonics, John-Wiley & Sons 2007 New Jersey
2. W. Demtroder, Laser Spectroscopy, Springer-Verlag 2008 Berlin

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 17

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 23.53 | 47.06 | 29.41 | 0.0 | 0.0 | 0.0 |

**Provides:** doc. Mgr. Gregor Bánó, PhD.

**Date of last modification:** 22.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

**COURSE INFORMATION LETTER**

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚFV/ FCH1/02 | **Course name:** Physical Chemistry for Biological Sciences |

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

**Number of ECTS credits:** 6

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

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

**Prerequisities:**

**Conditions for course completion:**
Test
Exam
During an exam, a student should demonstrate his/her ability to solve theoretical exercises from the selected parts of the Physical chemistry for biological sciences. Morever, the students should be able to manifest theoretical knowledge from the chapters which are present in the brief outline of the course.

**Learning outcomes:**
The introduction into the fundamental knowledge of selected parts of physical chemistry with emphasis on the utilization of these knowledge for the study of physico-chemical properties of biomacromolecules and biological systems. After completing the course, the students should understand physico-chemical mechanisms of many biological processes.

**Brief outline of the course:**
Week 1
Physical chemistry - areas of research, importance for science, definition. Thermodynamics - definition, areas of interest. Thermodynamic system. Properties of thermodynamic system. Basic thermodynamic quantities (pressure, volume, temperature, internal energy). Zero law of thermodynamics. Ideal gas. Equation of state of an ideal gas. Gas mixtures - Dalton's law. Real gas. Van der Waals equation of state.
Week 2
1st law of thermodynamics. Internal energy, work, heat. Mathematical formulation of the 1st law of thermodynamics. Enthalpy. Heat capacity. Relationship between heat capacities at constant pressure and volume. Isothermal expansion of an ideal gas. Work in reversible and irreversible isothermal expansion. Adiabatic expansion of an ideal gas. Exothermic and endothermic reactions and processes. Standard state of substances. Hess's law.
Week 3
Examples of spontaneous processes in nature. Definitions of the 2nd law of thermodynamics (Kelvin, Celsius). Entropy - introduction of the term. Thermodynamic definition of entropy. Entropy as a state function. Carnot cycle. Efficiency of a heat engine. Claussius inequality. Entropy

of isothermal expansion, gas mixing, melting and evaporation processes. Dependence of entropy on temperature. Nernst's heat theorem. 3rd law of thermodynamics.
Week 4
Entropy as a property determining the spontaneity of processes. Criteria of process spontaneity at constant volume and constant pressure. Helmoltz and Gibbs free energy. Properties of Helmoltz energy. Properties of Gibbs energy. Standard Gibbs energy of a chemical reaction. Dependence of Gibbs energy on temperature - Gibbs-Helmoltz equation. Dependence of Gibbs energy on pressure for solids, liquids and gases. Simple mixtures. Partial molar volume. Partial molar Gibbs energy, chemical potential.
Week 5
Chemical potential in a liquid. Raoult's law, the ideal solution. Henry's law, ideally diluted solution. Mixing solutions, ideal solutions. Residual functions and regular solutions. Colligative properties. Increasing the boiling point and decreasing the melting point of the liquid in which the soluble chemical compound is located. Osmosis. Solvent activity, soluble substance activity.
Week 6
Chemical equilibrium. Gibbs energy of a chemical reaction. Chemical equilibrium in an ideal gas. Equilibrium constant of chemical reaction. Temperature dependence of the equilibrium constant - van‘t Hoff's equation. Stability of protein structure. Thermal denaturation of proteins. Van’t Hoff enthalpy of protein denaturation. Chemical denaturation of proteins. Physiological consequences of incorrectly folded proteins.
Week 7
Examples of molecular associations and their significance for biological systems. Dissociation and association binding constants. Determination of dissociation binding constant - Langmuir isotherm. Cooperativity in ligand-macromolecule interactions. Cooperativity - simultaneous ligand binding, Hill's equation. Cooperativity - gradual binding of ligands. Allosteric interactions. Qualitative description of the Monod - Wyman - Changeaux model for cooperative binding of ligands to macromolecules. Experimental methods used to study the ligand - macromolecule interactions.
Week 8 Chemical and biochemical kinetics - basic definitions. Rates of chemical reactions. Rate constant. Order of chemical reaction. First order reactions. Second order reactions. Consecutive reactions. Determination of the rate law. Reverse chemical reactions. Relaxation processes. Temperature dependence of rate constants - Arrhenius equation. Experimental techniques used to determine the rates of chemical reactions. Transition state theory - Eyring's theory.
Week 9
Enzymes - characterization and classification. Equilibrium model of enzyme kinetics. Steady state model of enzyme kinetics. Experimental determination of maximum rate and Michaelis-Menten constant in enzymatic reactions. Deviations from Michaelis-Menten kinetics. Enzyme inhibition. Reversible inhibition. Competitive, non-competitive and uncompetitive inhibition.
Week 10
Kinetics of photophysical and photochemical processes. Jablonski diagram. Fluorescence, phosphorescence. Quantum yields of photophysical processes. Quenching of the excited states of molecules by external factors. Fluorescence quenching. Stern-Volmer equation. Förster resonance energy transfer (FRET). Biological application of FRET.
Week 11
Electrochemical reactions. Electrochemical cell. Standard redox potentials. Relationship between Gibbs energy change and electrochemical potential. Temperature dependence of electrochemical potential. Use of electrochemical cells. Determination of redox potential. Ionic electrochemical gradient. Proton motive force. Nernst potential. Introduction to the respiratory chain in mitochondria.
Week 12

Acids and bases. Acid-base properties of water. pH - measurement of environmental acidity. Dissociation of acids and bases - acid-base equilibrium. Henderson - Hasselbalch equation. Buffers.

**Recommended literature:**

1. P. Atkins and J. de Paula. Atkins's Physical Chemistry (9th Edition), Oxford University Press, 2010.
2. P. Atkins. Fyzikálna chémia (slovenský preklad 6. vydania), STU Bratislava, 1999.
3. P. Atkins, J. De Paula. Fyzikální chemie ( český preklad 9. vydania), VŠCHT Praha, 2013
4. R.Chang. Physical Chemistry for the Biosciences, University Science Book, 2006.
5. D. Eisenberg and D. Crothers. Physical Chemistry with Applications to the Life Sciences, Benjamin/Cummings, 1979.
6. K. van Holde, W. Johnson and P. Ho. Principles of Physical Biochemistry, Prentice Hall, 1988.
7. D.T. Haynie. Biological Thermodynamics (2nd Edition), Cambridge University Press, 2008.
8. A.P.H. Peters. Concise Chemical Thermodynamics (3rd Edition), CRC Press, Taylor & Francis Group, 2010.
9. I. Tinoco, jr., K. Sauer, J.C. Wang, J.C. Puglisi, G. Harbison and D.Rovnyak. Physical Chemistry – Principles and Applications in Biological Sciences (5th Edition), Pearson, 2014.
10. A. Cooksy. Physical Chemistry- Thermodynamics, Statistical Mechanics, and Kinetics, Pearson, 2014.

**Course language:**
English language

**Notes:**

**Course assessment**
Total number of assessed students: 118

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 18.64 | 27.97 | 33.05 | 11.02 | 9.32 | 0.0 |

**Provides:** doc. Mgr. Daniel Jancura, PhD.

**Date of last modification:** 17.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ LEK1/02 | **Course name:** Physical Principles of Medical Diagnostics and Therapy |
|---|---|

**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:** 2

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
To complete successfully the course, the student has to demonstrate the understanding of the basic notions and the physical principles of medical technology, especially of the diagnostic (imaging). In addition to attending classes, it is necessary for the student to study some specifics (details) of the discussed issues within self-study. The conditions for obtaining credits is, in addition to participation in teaching and passing the final exam, a successful completion of a written test. The minimum limit for passing the exam is to obtain 51% of the total score, which takes into account all required activities. The credit evaluation takes into account the following student workload: direct teaching - 1 credit, self-study of recommended literature - 1 credit, continuous study for the test and evaluation - 1 credit.
Rating scales: A - 91% -100% points, B - 81% -90% points, C - 71% -80% points, D - 61% -70% points, E - 51% -60% points.

**Learning outcomes:**
After completing the lectures, the student will have the knowledge to understand the principles and operation of modern medical devices, such as e.g. ultrasound diagnostics, computed transmission tomography, computed emission (positron) tomography, magnetic (resonance) tomography, radiotherapy and lasers, and to be able to explain the principles and use of the facilities to others. The acquired knowledge should also be a good prerequisite for a possible employment of the student in companies producing or operating modern medical technology.

**Brief outline of the course:**
1. Division of medical technology into diagnostic and therapeutic. A brief history of medical technology.
2. Ultrasound diagnostics (USG). Basic terms - used frequencies, wave intensities, acoustic impedance, ultrasound generation, absorption of ultrasonic waves, reflection and refraction of waves, space resolution, focusing of waves. Types of ultrasound imaging: type A and B imaging, creation of a dynamic (real time) image, time imaging (time motion). Some methods of signal processing: digitization, time-dependent signal balancing, etc.
3. Ultrasound diagnostics based on Doppler effect. Systems with unmodulated and modulated carrier waves, examination of blood flow in the organism. Possibilities of ultrasound diagnostics and

its advantages. Interaction of ultrasound with tissues (active and passive), principles of ultrasound therapy.
4. Transmission computed tomography (CT). Absorption of X-rays in tissues, evaluation of relationships between the intensity of incident and the intensity of penetrated radiation, image constructions.
5. Construction of a CT equipment, X-ray source, detection system, evaluation and processing of results. Types (generations) of CT devices. Implementation of CT examination and image evaluation. 6. Emission computed tomography (ET). Single-photon emission tomography - selection of suitable radionuclides and evaluation of the distribution of radionuclides in the body.
7. Construction of emission tomograph, benefits and use of emission tomography. Positron emission tomography (PET). Positron emitters, positron - electron annihilation, coincident photon detection. Construction of PET equipment, benefits and use of PET.
8. Thermography - basic concepts. Contact thermography - properties of liquid crystals, detection of changes in surface temperature of an organism. Contactless thermography. Radiation of bodies, detection of infrared radiation, distribution and properties of detectors. Thermograph design, use of thermography in medicine and other areas.
9. Magnetic (resonance) tomography (MR/MT). Principles of nuclear magnetic resonance - magnetic moment of the nucleus, movement (precession) of magnetic moments in magnetic field. Longitudinal and transverse relaxation times, causes of their change. Methods of measuring relaxation times.
10. Acquisition of image information - use of magnetic field gradients, methods of their creation. Design of magnetic tomographs - basic magnet, high frequency coils, shielded rooms, evaluation systems. Possibilities and use of MT, the use of contrast agents.
11. Lasers in medical technology. Principle of laser operation, spontaneous and induced emission, three-level lasers (solid, gas), construction of lasers. Properties of laser radiation and the effect of laser beam on biological objects (tissues). Use of lasers in various fields of medicine.
12. Principles of radiotherapy. Interaction of various ionizing particles (photons, electrons, neutrons, protons) with the environment. Biological effects of ionizing radiation, applied doses, survival curves. New methods of irradiation, the use of Bragg maximum in hadron irradiation therapy, neutron capture therapy. Possibilities of ionizing radiation beam modification.

**Recommended literature:**

- Režňák I. et al., Modern imaging methods in medical diagnostics, Vyd. Osveta, Martin, 1992.
- Jurga Ľ. et al., Basics of Medical Radiology, Script of LF UPJŠ, Košice, 1990.
- Mc Ainsh T.F., Physics in Medicine and Biology, Pergamon Press, Oxford, 1987.
- Huda W., Slone R.M., Review of Radiologic Physics, Lippincot, London, 1995
- Bushberg J.T, et al., The essential physics of imaging, Lippincott Williams, Philadelphia, 2002.

**Course language:**

Slovak, English

**Notes:**

Recommended range of lessons (in hours): Weekly: 2/0
For the period of study: 26/0
Method of study: Teaching is carried out in person, if necessary remotely, in the environment of MS Teams.
Number of ECTS credits: 3
Degree of studz: I. resp. II.
Prerequisites: none

**Course assessment**
Total number of assessed students: 42

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 88.1 | 9.52 | 2.38 | 0.0 | 0.0 | 0.0 |

**Provides:** doc. RNDr. Karol Flachbart, DrSc.

**Date of last modification:** 06.10.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ PMPI/22 | **Course name:** Pokročilé metódy proteínového inžinierstva |
|---|---|

**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:** 3.

**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: 3

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

**Provides:** prof. RNDr. Erik Sedlák, DrSc.

**Date of last modification:** 29.06.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

**COURSE INFORMATION LETTER**

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚFV/ PKIVL/22 | **Course name:** Porozumenie a kritická interpretácia vedeckej literatúry |

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

**Number of ECTS credits:** 3

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Presentation of the publication, active and critical participation in discussion regarding the presented results, active attendance at the lectures.

**Learning outcomes:**
Students will be able independently work in scientific databases, analyze and interpret results published in the literature.

**Brief outline of the course:**
Week 1 - Introduction to the analysis of scientific literature - access, databases and selection of articles.
Week 2 - Methods of evaluating scientific literature - critical thinking, ability to evaluate experimental design and results.
Week 3 - Methods of evaluation of scientific literature - creation of alternative explanations.
Week 4 - Module 1 - selection of 3 articles with the same research subjects but different interpretations; division into working groups
Week 5 - Evaluation and comparison of experimental approaches in articles - analysis of working groups.
Week 6 - Evaluation and comparison of hypotheses, experimental results and discussion in articles - analysis of working groups.
Week 7 - Continuous assessment of students in the evaluation of literature - test
Week 8 - Module 2 - selection of 3 articles with the same research subjects but different interpretations - assignment for individuals
Week 9 - Presentation of student evaluation of articles and discussion
Week 10 - Written evaluation of the article - "per review" process.
Week 11 - Module 3 - Example of processed per review evaluation - discussion.
Week 12 - Final assignment of article evaluation for students.

**Recommended literature:**
1. Alan J. Gottesman and Sally G. Hoskins (2013) CREATE Cornerstone: Introduction to Scientific Thinking, a New Course for STEM-Interested Freshmen, Demystifies Scientific Thinking through Analysis of Scientific Literature CBE—Life Sciences Education; Vol. 12, 59–72, Spring 2013

2. Abdullah C. et al (2015)Critical Analysis of Primary Literature in a Master's-Level Class: Effects on Self-Efficacy and Science-Process Skills; CBE—Life Sciences Education Vol. 14, 1–13, Fall 2015
3. Price et al 2021 A Detailed Characterization of the Expert Problem-Solving Process in Science and Engineering: Guidance for Teaching and Assessment CBE—Life Sciences Education • 20:ar43, 1–15, Fall 2021
4. Purugganan et al 2004 How to Read a Scientific Article Cain Project for Engineering and Professional Communication, Rice University, 2004
5. Hubbard K. and Dunbar S. 2017 Perceptions of scientific research literature and strategies for reading papers depend on academic career stage PLoS One. 2017; 12(12): e0189753
6. Hoskins S (2019) CREATE a Revolution in Undergraduates' Understanding of Science: Teach through Close Analysis of Scientific Literature; https://doi.org/10.1162/DAED_a_01764
Publications from top level journals in the field published within last three years. Publications should contain topics regarding the focus of the research in the Department of Biophysics, and also a new approaches or methods.

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 5

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

**Provides:** doc. RNDr. Katarína Štroffeková, PhD.

**Date of last modification:** 21.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/PRb/04 | **Course name:** Practical excercises in methods of optical spectroscopy |
|---|---|

**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:** 2.

**Course level:** II.

**Prerequisities:** ÚFV/MOS/14

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**
1. V. Prosser a kol., Experimentální metody biofyziky, Academia, Praha 1989.
2. S. Miertus a kol., Atómová a molekulová spektroskopia, Alfa, Bratislava 1991.
3. P. Jasem a kol., Praktikum k experimentálnym metódam biofyziky, PF UPJŠ, Košice 1990.
4. I.N. Serdyuk, N.R. Zaccai and J. Zaccai, Methods in molecular biophysics, Cambridge University Press, 2007.

**Course language:**
Slovak

**Notes:**

**Course assessment**
Total number of assessed students: 15

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 93.33 | 6.67 | 0.0 | 0.0 | 0.0 | 0.0 |

**Provides:** RNDr. Gabriela Fabriciová, PhD.

**Date of last modification:** 30.03.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ PEMBF/14 | **Course name:** Practical exercises in experimental methods of biophysics |
|---|---|

**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:** 4.

**Course level:** II.

**Prerequisities:** ÚFV/EMBF/14

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**
1. J.E. Landbury and B.Z. Chowdhry, Biocalorimetry: Application of calorimetry in the biological sciences, Wiley, 1998
2. Alice L. Givan: Flow Cytometry, first principles, second edition, Wiley, 2001
3. Joseph R. Lakowicz: Principles of Fluorescence Spectroscopy, Third edition, Springer 2006
4. Ewa M. Goldys: Fluorescence Applications in Biotechnology and the Life Sciences, 2009, Wiley-Blackwell

**Course language:**

**Notes:**

**Course assessment**
Total number of assessed students: 11

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

**Provides:** prof. RNDr. Erik Sedlák, DrSc., RNDr. Gabriela Fabriciová, PhD., doc. RNDr. Katarína Štroffeková, PhD., RNDr. Marián Fabián, CSc.

**Date of last modification:** 30.03.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ PPNK/22 | **Course name:** Praktikum z biofyziky proteínov a nukleových kyselín |
|---|---|

**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:** 3

**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**
Total number of assessed students: 4

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

**Provides:** RNDr. Gabriela Fabriciová, PhD., doc. RNDr. Rastislav Varhač, PhD.

**Date of last modification:** 07.10.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/PI/22 | **Course name:** Proteínové inžinierstvo |
|---|---|

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

**Number of ECTS credits:** 5

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**

**Course language:**

**Notes:**

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

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

**Provides:** prof. RNDr. Erik Sedlák, DrSc.

**Date of last modification:** 29.06.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/PSF/22 | **Course name:** Proteíny - štruktúra a funkcia |
|---|---|

**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.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
1. preparation and presentation of the selected publication
2. oral examination

**Learning outcomes:**
Introduction to proteins, structure and function.

**Brief outline of the course:**
1. Amino acids and their physicochemical properties
2. Peptide binding and polypeptide chain
3. Detection of amino acids, peptides and proteins
4. Separation methods, determination of protein size
5. Determination of covalent structure of proteins
6. Synthesis of peptides, biosynthesis of proteins and peptides
7. Determination of secondary and tertiary structure of proteins
8. Posttranslational modifications - enzymatic
9. Posttranslational modifications - non-enzymatic
10. Interactions determining the properties of proteins, conformational changes of proteins
11. Protein folding, protein aggregation, prions
12. Membrane proteins

**Recommended literature:**

**Course language:**
Slovak, English

**Notes:**

**Course assessment**
Total number of assessed students: 4

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 0.0 | 50.0 | 50.0 | 0.0 | 0.0 | 0.0 |

**Provides:** doc. RNDr. Gabriel Žoldák, DrSc., doc. RNDr. Rastislav Varhač, PhD.

| |
|---|
| **Date of last modification:** 25.06.2021 |
| **Approved:** prof. RNDr. Pavol Miškovský, DrSc. |

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

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

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

**Prerequisities:**

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

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

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

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

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

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 54

| abs | n |
|---|---|
| 11.11 | 88.89 |

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

**Date of last modification:** 29.03.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

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

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

**Number of ECTS credits:** 2

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**

**Recommended literature:**

**Course language:**

**Notes:**

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

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

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

**Date of last modification:** 27.04.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ SPBFa/14 | **Course name:** Semestral thesis I |
|---|---|

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

**Number of ECTS credits:** 2

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Successful completing the course, requires the student to demonstrate adequate level of the assigned tasks set by the project leader at the beginning of the semester to the required extent and at the required level. The assignments are formulated by the teacher at the beginning of the semester, the project leader is usually the supervisor of the final thesis. Tasks include e.g. study of literature in the field, mastering the operation of experimental equipment, sample preparation technology, preparation and implementation of the experiment, processing of the obtained data, or collaborating during the preparation of a scientific publication. Credit evaluation takes into account the time requirements of the student when working on a semester project in the range of 50 hours per semester. Individual activities of the student are evaluated by the project leader, the overall work of the student is evaluated by points on a point scale of 0 - 100 points. The minimum threshold for obtaining a rating is 50% of the rating scale, which is determined as follows: A 100-91% B 90-81% C 80-71% D 70-61% E 60-50% Fx 49-0%.

**Learning outcomes:**
After completing the course, the student will acquire knowledge and skills associated with scientific work in the field of biophysics. By actively participating in individual research teams, students will extend their knowledge in the relevant part of biophysics, acquire experimental skills in operating contemporary scientific equipment, study of the literature will improve their language skills. Data processing resp. the creation of original software will improve their computer skills.

**Brief outline of the course:**
Program for semestral project is prepared individually for each student by supervisor of the project at the beginning of each semester and can be focused on search in literature for a selected area of research, preparation of experiment and its performing, creation of software for data acquisition and analysis, collaboration during preparation of manuscript, presentation of the obtained results for department audience. Supervisor of the project will specify the topic of the project.

**Recommended literature:**
The literature will be recommended by supervisors of individual works.

**Course language:**

**Notes:**

Subject Semester work I is realized in attendance form. If necessary (e.g. Covid pandemic) it is taught online using software MS Teams, which allows to maintain contact with students even in adverse conditions and also allows to meet the requirements of the subject.

**Course assessment**

Total number of assessed students: 14

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 85.71 | 14.29 | 0.0 | 0.0 | 0.0 | 0.0 |

**Provides:**

**Date of last modification:** 30.03.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ SPBFb/14 | **Course name:** Semestral thesis II |
|---|---|

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

**Number of ECTS credits:** 6

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Successful completing the course, requires the student to demonstrate adequate level of the assigned tasks set by the project leader at the beginning of the semester to the required extent and at the required level. The assignments are formulated by the teacher at the beginning of the semester, the project leader is usually the supervisor of the final thesis. Tasks include e.g. study of literature in the field, mastering the operation of experimental equipment, sample preparation technology, preparation and implementation of the experiment, processing of the obtained data, or collaborating during the preparation of a scientific publication. Credit evaluation takes into account the time requirements of the student when working on a semester project in the range of 50 hours per semester. Individual activities of the student are evaluated by the project leader, the overall work of the student is evaluated by points on a point scale of 0 - 100 points. The minimum threshold for obtaining a rating is 50% of the rating scale, which is determined as follows: A 100-91% B 90-81% C 80-71% D 70-61% E 60-50% Fx 49-0%.

**Learning outcomes:**
After completing the course, the student will acquire knowledge and skills associated with scientific work in the field of biophysics. By actively participating in individual research teams, students will extend their knowledge in the relevant part of biophysics, acquire experimental skills in operating contemporary scientific equipment, study of the literature will improve their language skills. Data processing resp. the creation of original software will improve their computer skills.

**Brief outline of the course:**
Program for semestral project is prepared individually for each student by supervisor of the project at the beginning of each semester and can be focused on search in literature for a selected area of research, preparation of experiment and its performing, creation of software for data acquisition and analysis, collaboration during preparation of manuscript, presentation of the obtained results for department audience. Supervisor of the project will specify the topic of the project.

**Recommended literature:**
The literature will be recommended by supervisors of individual works.

**Course language:**

**Notes:**

Subject Semester work I is realized in attendance form. If necessary (e.g. Covid pandemic) it is taught online using software MS Teams, which allows to maintain contact with students even in adverse conditions and also allows to meet the requirements of the subject.

**Course assessment**

Total number of assessed students: 14

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

**Provides:**

**Date of last modification:** 30.03.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ SPBFc/14 | **Course name:** Semestral thesis III |
|---|---|

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

**Number of ECTS credits:** 6

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
Successful completing the course, requires the student to demonstrate adequate level of the assigned tasks set by the project leader at the beginning of the semester to the required extent and at the required level. The assignments are formulated by the teacher at the beginning of the semester, the project leader is usually the supervisor of the final thesis. Tasks include e.g. study of literature in the field, mastering the operation of experimental equipment, sample preparation technology, preparation and implementation of the experiment, processing of the obtained data, or collaborating during the preparation of a scientific publication. Credit evaluation takes into account the time requirements of the student when working on a semester project in the range of 50 hours per semester. Individual activities of the student are evaluated by the project leader, the overall work of the student is evaluated by points on a point scale of 0 - 100 points. The minimum threshold for obtaining a rating is 50% of the rating scale, which is determined as follows: A 100-91% B 90-81% C 80-71% D 70-61% E 60-50% Fx 49-0%.

**Learning outcomes:**
After completing the course, the student will acquire knowledge and skills associated with scientific work in the field of biophysics. By actively participating in individual research teams, students will extend their knowledge in the relevant part of biophysics, acquire experimental skills in operating contemporary scientific equipment, study of the literature will improve their language skills. Data processing resp. the creation of original software will improve their computer skills.

**Brief outline of the course:**
Program for semestral project is prepared individually for each student by supervisor of the project at the beginning of each semester and can be focused on search in literature for a selected area of research, preparation of experiment and its performing, creation of software for data acquisition and analysis, collaboration during preparation of manuscript, presentation of the obtained results for department audience. Supervisor of the project will specify the topic of the project.

**Recommended literature:**
The literature will be recommended by supervisors of individual works.

**Course language:**

**Notes:**

Subject Semester work I is realized in attendance form. If necessary (e.g. Covid pandemic) it is taught online using software MS Teams, which allows to maintain contact with students even in adverse conditions and also allows to meet the requirements of the subject.

**Course assessment**

Total number of assessed students: 21

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 90.48 | 0.0 | 9.52 | 0.0 | 0.0 | 0.0 |

**Provides:**

**Date of last modification:** 30.03.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/SMP/22 | **Course name:** Seminár k magisterskej práci |
|---|---|

**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:** 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: 4

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

**Provides:**

**Date of last modification:** 13.09.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/SSP/22 | **Course name:** Seminár k semestrálnej práci |
|---|---|

**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:** 3

**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**
Total number of assessed students: 1

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

**Provides:**

**Date of last modification:** 13.09.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚFV/ SMT/22 | **Course name:** Single-molecule techniky |
|---|---|

**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:** 3.

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**
1. preparation and presentation of the selected publication
2. oral examination

**Learning outcomes:**
The current single-molecule techniques, analysis and design of equipment.

**Brief outline of the course:**
1. Single-molecule techniques, history, types
2. Fluorescence correlation spectroscopy I
3. Fluorescence correlation spectroscopy II
4. Particle tracking, raster-image correlation spectroscopy
5. Multiparametric fluorescence analysis, burst, PIE analysis
6. Concept of instruments for fluorescence microscopy
7. Acoustic force spectroscopy
8. AFM - force spectroscopy
9. Magnetic optical tweezers, principle and applications
10. Laser optical tweezers - principle and construction
11. Laser optical tweezers - mechanics of proteins and nucleic acids
12. Laser optical tweezers - mechanics of molecular machines

**Recommended literature:**

**Course language:**
Slovak, English

**Notes:**

**Course assessment**
Total number of assessed students: 0

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

**Provides:** doc. RNDr. Gabriel Žoldák, DrSc.

| |
|---|
| **Date of last modification:** 25.06.2021 |
| **Approved:** prof. RNDr. Pavol Miškovský, DrSc. |

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

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

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

**Prerequisities:**

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

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

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

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

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 15193

| abs | abs-A | abs-B | abs-C | abs-D | abs-E | n | neabs |
|---|---|---|---|---|---|---|---|
| 86.05 | 0.07 | 0.0 | 0.0 | 0.0 | 0.05 | 8.69 | 5.15 |

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

**Date of last modification:** 07.02.2024

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

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

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

**Prerequisities:**

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

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

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

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

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 13318

| abs | abs-A | abs-B | abs-C | abs-D | abs-E | n | neabs |
|---|---|---|---|---|---|---|---|
| 84.37 | 0.51 | 0.02 | 0.0 | 0.0 | 0.05 | 10.78 | 4.28 |

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

**Date of last modification:** 07.02.2024

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

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

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

**Prerequisities:**

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

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

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

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

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 9100

| abs | abs-A | abs-B | abs-C | abs-D | abs-E | n | neabs |
|---|---|---|---|---|---|---|---|
| 88.37 | 0.07 | 0.01 | 0.0 | 0.0 | 0.02 | 4.46 | 7.07 |

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

**Date of last modification:** 07.02.2024

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

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

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

**Prerequisities:**

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

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

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

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

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 5671

| abs | abs-A | abs-B | abs-C | abs-D | abs-E | n | neabs |
|---|---|---|---|---|---|---|---|
| 82.81 | 0.28 | 0.04 | 0.0 | 0.0 | 0.0 | 7.97 | 8.9 |

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

**Date of last modification:** 07.02.2024

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

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

**Faculty:** Faculty of Science

| **Course ID:** ÚCHV/ STA1/03 | **Course name:** Structure Analysis |
|---|---|

**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:**
2 written tests during semester and written examination.
The final evaluation is based on the results from the tests (30 %) and written examination (70 %).
The student must obtain at least 51% of each test and exam.
The same is valid also for online education.

**Learning outcomes:**
Students get an overview about the symmetry at the micro- and macrostructure level, about principles of difraction and about diffraction methods used for the crystal structure determination and they will learn how to use the results of the crystal structure analysis in their own work.

**Brief outline of the course:**
Macrostructure and microstructure symmetry, individual work with space groups. Theoretical basis of the diffraction experiment. Practical aspects of crystal structure solution. Processing the results of structural analysis. Theoretical basis, practical aspects and possibilities of X-ray powder diffraction analysis, its use at work of a chemist.

**Recommended literature:**
Massa, W.: Crystal structure determination, 2nd edition. Springer 2004.
Clegg, W. et al.: Crystal structure analysis. Principles and practice. Oxford University Press 2009.
Hahn, T.: International tables for crystallography, Vol. A. Kluwer Academic Publishers 2002.
Klug, H.P. & Alexander, L.E.: X-Ray diffraction procedures for polycrystalline and amorphous materials. John Wiley & Sons, Inc. 1970.

**Course language:**
Slovak and English

**Notes:**
Teaching is carried out in person or, if necessary, online using the MS Teams tool. The form of teaching is specified by the teacher at the beginning of the semester, updated continuously.

| **Course assessment**<br>Total number of assessed students: 148 | | | | | |
|---|---|---|---|---|---|
| A | B | C | D | E | FX |
| 26.35 | 16.22 | 28.38 | 20.27 | 8.11 | 0.68 |
| **Provides:** doc. RNDr. Ivan Potočňák, PhD. | | | | | |
| **Date of last modification:** 21.07.2022 | | | | | |
| **Approved:** prof. RNDr. Pavol Miškovský, DrSc. | | | | | |

## COURSE INFORMATION LETTER

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚFV/ SVKB/14 | **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:** 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: 3

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

| |
|---|
| **Provides:** |
| **Date of last modification:** 30.11.2021 |
| **Approved:** prof. RNDr. Pavol Miškovský, DrSc. |

**COURSE INFORMATION LETTER**

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

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

**Number of ECTS credits:** 2

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

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

**Prerequisities:**

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

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

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

11. Capsizing
12. Commands

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

**Course language:**
Slovak language

**Notes:**

**Course assessment**
Total number of assessed students: 209

| abs | n |
|---|---|
| 37.32 | 62.68 |

**Provides:** Mgr. Dávid Kaško, PhD.

**Date of last modification:** 29.03.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

**COURSE INFORMATION LETTER**

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚFV/ TVPP/22 | **Course name:** Tvorba vedeckých projektov a publikácií |

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

**Number of ECTS credits:** 3

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

**Course level:** II.

**Prerequisities:**

**Conditions for course completion:**

**Learning outcomes:**

**Brief outline of the course:**
Week 1 - Define the need of proposal - first step in creating a comprehensive project plan and proposal is defining your need, or what you want to accomplish.
Week 2 - Identify and Contact Potential Funders - Find an organization that supports the vision or goal you have identified.
Week 3 - Craft the Proposal
Know the preliminary components needed to apply for any grant funding.
Appreciate the importance of communicating grant ideas clearly. Understand the basic construction of a grant and how to address each component.
Understand the budget process and its implications.
Understand the aspects of a general peer review process, what it entails, and what happens after the grant application submission.
Week 4 - Basic Proposal Elements
• Executive Summary/Abstract
• Statement of Need
• Project Description
• Evaluation
• Sustainability
• Budget
Week 5 - Writing your own project according to the assignment
Week 6 - Scientific Writing: Strategies and Tools for Students and Advisors
Week 7 - Stages of writing process – preparing the material for paper, figures, references
Week 8 - Selecting a journal – follow journal manuscript format demands
Week 9 - Structure of the manuscript – Introduction, Material and Methods, Results, Discussion
Week 10 - Drafts of manuscript – final draft – revising grammar, readability and layout.
Week 11 - Writing your own paper – exercise.

**Recommended literature:**

Rekha S. Rajan a Daniel R. Tomal Grant Writing: Practical Strategies for Scholars and Professionals (The Concordia University Leadership Series) Paperback – July 8, 2015 Rowman & Littlefield Publishers ISBN-10: 1475814410
Robert J. Hamper a L. Baugh (Author) Handbook For Writing Proposals, Second Edition Paperback – Illustrated, August 26, 2010 McGraw-Hill Education ISBN-10 007174648X
Anne L. Rothstein Creating Winning Grant Proposals: A Step-by-Step Guide 1st Edition ISBN-13: 978-1462539086; ISBN-10: 1462539084
Vikash Singh, Philipp Mayer Scientific writing: Strategies and tools for students and advisors Biochemistry and Molecular Biology Education 42(5) https://doi.org/10.1002/bmb.20815
Margaret Cargill, Patrick O'Connor Writing Scientific Research Articles: Strategy and Steps, 2nd Edition (2013) ISBN: 978-1-118-57070-8
Hilary Glasman-Deal Science Research Writing For Non-native Speakers Of English Imperial College Press; • World Scientific Publishing Company; December 2009; ISBN: 9781848167209
Schimel Joshua Writing Science : How to Write Papers That Get Cited and Proposals That Get Funded 2012 Oxford University Press ISBN-13: 978-0199760244; ISBN-10: 0199760241
Stephen B. Heard The Scientist's Guide to Writing: How to Write More Easily and Effectively throughout Your Scientific Career Paperback – April 12, 2016; Princeton University Press; ISBN-10 0691170223
Wendy Laura Belcher Writing Your Journal Article in Twelve Weeks, Second Edition: A Guide to Academic Publishing Success (Chicago Guides to Writing, Editing, and Publishing) Second Edition; ISBN-13: 978-0226499918; ISBN-10: 022649991X
Paul J. Silvia How to Write a Lot: A Practical Guide to Productive Academic Writing (2018) Second Edition ISBN-13: 978-1433829734; ISBN-10: 1433829738

**Course language:**

**Notes:**

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

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 50.0 | 50.0 | 0.0 | 0.0 | 0.0 | 0.0 |

**Provides:** doc. RNDr. Katarína Štroffeková, PhD.

**Date of last modification:** 21.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## 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., 3.

**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: 37

| A | B | C | D | E | FX |
|---|---|---|---|---|---|
| 91.89 | 5.41 | 0.0 | 2.7 | 0.0 | 0.0 |

**Provides:** doc. RNDr. Peter Pristaš, CSc., RNDr. Mária Piknová, PhD., RNDr. Mariana Kolesárová, PhD., RNDr. Jana Kisková, PhD.

**Date of last modification:** 23.06.2022

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.

## COURSE INFORMATION LETTER

| | |
|---|---|
| **University:** P. J. Šafárik University in Košice | |
| **Faculty:** Faculty of Science | |
| **Course ID:** ÚFV/ LCHT/22 | **Course name:** Vybrané lab on chip technológie |
| **Course type, scope and the method:**<br>**Course type:** Lecture / Practice<br>**Recommended course-load (hours):**<br>**Per week:** 2 / 1 **Per study period:** 28 / 14<br>**Course method:** present | |
| **Number of ECTS credits:** 4 | |
| **Recommended semester/trimester of the course:** 2., 4. | |
| **Course level:** II. | |
| **Prerequisities:** | |
| **Conditions for course completion:**<br>Project focused on the construction of optical tweezers and its use for manipulating objects in a microfluidic system. | |
| **Learning outcomes:**<br>By completing the course, students will gain basic knowledge about the use of microfluidic systems. We will focus on lab-on-chip technologies associated with optical micro-manipulation of biologically relevant samples. Students will build their own experimental equipment, and they will learn how to design and fabricate simple microfluidic chips. | |
| **Brief outline of the course:**<br>1. Overview of lab-on-chip technologies in biophysical and biomedical applications.<br>2. Physical basis of fluid flow, microrheology, heat transfer.<br>3. Instrumentation of microfluidic systems.<br>4. Basics of optical micromanipulation, sources of laser radiation, design of optical systems, optical imaging.<br>Project:<br>5-6. Construction of an optical tweezers apparatus.<br>7. Design and preparation of a microfluidic system.<br>8-9. Calibration of optical tweezers stiffness,<br>10. Measurement of fluid flow rate in microchannels.<br>11-12. Numerical modeling of fluid flow and microstructure motion using the finite element method (eg COMSOL Multiphysics). | |
| **Recommended literature:**<br>Y. Song, D. Cheng, L. Zhao, Microfluidics, Wiley-VCH, 2018<br>J. Gieseler et al., Optical tweezers — from calibration to applications: a tutorial, Advances in Optics and Photonics 13, 74-241 (2021) | |
| **Course language:**<br>Slovak, English. | |
| **Notes:** | |

**Course assessment**
Total number of assessed students: 4

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

**Provides:** doc. Mgr. Gregor Bánó, PhD., doc. RNDr. Gabriel Žoldák, DrSc.

**Date of last modification:** 22.09.2021

**Approved:** prof. RNDr. Pavol Miškovský, DrSc.