COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ IG/04	**Course name:** Acquirement of Internal Grant
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 10	
Recommended semester/trimester of the course: 6., 8.	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 75

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SAVBVK/14	**Course name:** Analysis of Biophysical Properties of Ion Channels

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

Number of credits: 3

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
During semester there will be two oral examinations/presentations for 40 points. If student gains less than 20 points, she/he will not earn any credit.

Learning outcomes:
Absolvent will receive relevant knowledge about biophysical properties of single ion channels with the focus on the pharmacological applications. She/he will master modern methods for analysis and will be able to adequately apply them for obtaining detail information about conductive characteristics and the gating behaviour of single ion channels. She/he will be able to assess benefits and risks of using the specific analysis strategy in practice.

Brief outline of the course:
Analysis of ion channel gating kinetics, fitting methods for the description of open and closed time distributions, analysis of burst gating kinetics, the channel selectivity and ion conductance, current theoretical models of conductive and permeation properties of ion channels.

Recommended literature:
B. Hille: Ionic channels of excitable membranes, Sinauer Associates, 1992
B. Sakmann, E. Neher: Single-channel recording, Springer Science + Business Media, 2009

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 8

N	P
0.0	100.0

Provides: Mgr. Marta Gaburjáková, PhD.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PVS/04	**Course name:** Author's patents, discoveries, software
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 27	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ BIOE2/14	**Course name:** Bioenergetics II

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: Per study period: 17s / 15s
Course method: present

Number of credits: 6

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Individual work on a project.
Exam and completed individual project

Learning outcomes:
The main goal of the course is to provide a comprehensive review about principles and the up-to-date knowledge in Bioenergetics. The focus will be given on the complex description of the components of the respiratory chain in mitochondria, the mechanism of the oxidative phosphorylation, and the role of mitochondria in health, diseases and aging. The practices allow obtain skills in the isolation and purification of cytochrome c oxidase, terminal complex of the respiratory chain in mitochondria, and will investigate the catalytic properties of this enzyme.

Brief outline of the course:
Lectures:
Introduction to Bioenergetics. Mitochondria and oxidative phosphorylation. Respiratory chain and synthesis of ATP. Role of mitochondria in diseases and aging. Photosynthesis. Pumps and other transport systems in mitochondria.
Practices:
Isolation of cytochrom c oxidase and its catalytic properties
Project:
The final work on the selected theme.

Recommended literature:
1. D. Nicholls and S. Fergusson. Bioenergetics 3, Academic Press, 2002.
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. S. Pappa, F. Guerrini, J. Tager (Eds.). Frontiers of Cellular Bioenergetics, Kluwer Academic, 1999.
5. V. Saks (Ed.). Molecular System Bioenergetics, Wiley-VCH Verlag GmbH & Co., 2007.
6. I. Scheffer. Mitochondria (2nd Edition), John Wiley & Sons, Inc., 2008.
7. A.D.N.J. de Grey. The Mitochondrial Free Radical Theory of Aging, R.G. Landis Company, 1999.

8. V. Smil. Energy in Nature and Society, Massachusetts Insitute of Technology, 2008.

Course language:

Notes:

Course assessment
Total number of assessed students: 5

N	P
0.0	100.0

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

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ BTD/14	**Course name:** Biological Thermodynamics

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

Number of credits: 6

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Individual work on a project.
Exam and completed individual project

Learning outcomes:
The main goal of the course is to provide a comprehensive review about principles and the up-to-date knowledge in Biological thermodynamics. The focus will be given on the description of thermodynamical characteristics of the interactions between biomacromolecules and low-molecular ligands and the influence these interactions and various physical and chemical parameters on the stability of biopolymers. The practices will allow the students to gain experience and skills in the study of the thermodynamic characteristics of the interactions of biomacromolecule-ligand by methods isothermal titration calorimetry and differential scanning calorimetry.

Brief outline of the course:
Lectures:
Basics of thermodynamics. Thermodynamics of molecular associations. Thermodynamic stability of biomacromolecules and biological structures. Experimental methods of biological thermodynamics.
Practices:
Thermodynamic characterization of the interaction ligand-biomacromolecule
Project:
The final work on the selected theme.

Recommended literature:
1. P. Atkins and J. de Paula. Physical Chemistry (9th Edition), Oxford University Press, 2010.
2. R.Chang. Physical Chemistry for the Biosciences, University Science Book, 2006.
3. D.T. Haynie. Biological Thermodynamics (2nd Edition), Cambridge University Press, 2008.
4. Ch.P. Woodbury. Macromolecular Binding Equilibria, CRC Press, 2008.
5. D.A. Beard and H. Qian. Chemical Biophysics, Cambridge University Press, 2008.
6. A. Ben-Naim. A Farewell to Entropy: Statistical Thermodynamics Based on Information, World Scientific Publishing Co.Pte. Ttd., 2008.

7. T.E. Creighton (Ed.). Protein folding, W.H. Freeman and Company, 1992.
8. P. Nelson. Biological Physics, W.H. Freeman and Company, 2008.
9. I.N. Serdyuk, N.R. Zaccai and J. Zaccai. Methods in modern biophysics, Cambridge University Press, 2007.

Course language:

Notes:

Course assessment
Total number of assessed students: 6

N	P
0.0	100.0

Provides: doc. RNDr. Erik Sedlák, PhD., doc. Mgr. Daniel Jancura, PhD.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ BFT/14	**Course name:** Biophotonics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: Per study period: 24s / 26s
Course method: present

Number of credits: 8

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

Conditions for course completion:
Individual work on a project.
Exam and completed individual project.

Learning outcomes:
The course aim is to improve theoretical as well as practical knowledge of doctoral students in advanced methods of biophotonics. The course will offer students to reach knowledge on recent advances in biophotonic research which open new possibilities of non-contact, high-speed, multidimensional measurement of living cells under physiological conditions, in particular.

Brief outline of the course:
Brief outline of the course:
Theoretical courses
Introduction (repetitorium in optics and spectroscopy), Principles of optical experiments, Fluorescence spectroscopy and imaging , Advanced laser spectroscopy techniques, Advanced laser microscopy techniques, Biomedical applications, Cultural Heritage and Environmental applications.
Practical training
1. Steady-state absorption and fluorescence spectroscopy and imaging
2. Time resolved fluorescence spectroscopy and imaging
3. Raman macro- and micro spectroscopy and imaging
Individual projects
Individual research problems will be proposed to students for independent individual work in using a set of available experimental methods.

Recommended literature:
1. E. Hecht: Optics, fourth edition, Addison Wesley, 2002
2. B. E. A. Saleh, M. C. Teich: Fundamentals of Biophotonics, second edition, Wiley 2007
3. Paras N. Prasad: Introduction to Biophotonics, Wiley 2003
4. Joseph R. Lakowicz: Principles of Fluorescence Spectroscopy, Third edition, Springer 2006
5. W. Demtroder: Laser Spectroscopy, Volume 1 and 2, fourth edition, Springer 2008
6. W. J. Smith: Modern optical engeneering, Fourth edition, Spie Press, McGraw Hill 2008
7. Peter Atkins, Julio de Paula: Physical Chemistry, Oxford 2010

8. M. Schreiner, M. Strlič, R. Salimbeni: Handbook on the Use of Lasers in Conservation and Conservation Science, COST office, Brussels, Belgium (2008) http://conservationresearch.blogspot.com/2008/11/use-of-lasers-in-conservation-2008.html.
9. (Sackler NAS Colloquium) Scientific Examination of Art: Modern Techniques in Conservation and Analysis, Proc. of the National Academy of Science, pp. 254, The National Academies Press, Washington D.C. (2005), http://www.nap.edu/catalog/11413.html.
10. J.S. Mills and R. White: The Organic Chemistry of Museum Objects, 2nd edition, pp. 206, Butterworth-Heinemann Ltd, Oxford 2003
11. Domingo, C.; Cañamares, M.V.; Jurasekova, Z.; del Puerto, E.; Sánchez-Cortés, S.; García-Ramos, J.V.: Aplicaciones de la espectroscopía SERS (Surface-Enhanced Raman Scattering) a la detección de pigmentos orgánicos naturales en objetos del Patrimonio Cultural. Plasmónica: detección sobre nanoestructuras metálicas, pp. 197-230, P. Sevilla Ed., Comité de Espectroscopía, Sociedad Española de Óptica, Madrid (2010),
12. R. Aroca: Surface-Enhanced Vibrational Spectroscopy, pp. 233, John Wiley & Sons, Ltd, Chichester (2006)

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 26

N	P
0.0	100.0

Provides: prof. RNDr. Pavol Miškovský, DrSc.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ BFSa/14	**Course name:** Biophysics seminar

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 credits: 1

Recommended semester/trimester of the course: 3.

Course level: III.

Prerequisities:

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

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

Brief outline of the course:
Scientific seminar in the field of Biophysics.

Recommended literature:
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:
Slovak and English.

Notes:

Course assessment
Total number of assessed students: 6

N	P
0.0	100.0

Provides: RNDr. Katarína Štroffeková, PhD.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ BFSb/14	**Course name:** Biophysics seminar

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 credits: 1

Recommended semester/trimester of the course: 4.

Course level: III.

Prerequisities:

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

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

Brief outline of the course:
Scientific seminar in the field of Biophysics.

Recommended literature:
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:
Slovak and English.

Notes:

Course assessment
Total number of assessed students: 6

N	P
0.0	100.0

Provides: RNDr. Katarína Štroffeková, PhD.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ BFSc/14	**Course name:** Biophysics seminar

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 credits: 1

Recommended semester/trimester of the course: 5.

Course level: III.

Prerequisities:

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

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

Brief outline of the course:
Scientific seminar in the field of Biophysics.

Recommended literature:
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:
Slovak and English.

Notes:

Course assessment
Total number of assessed students: 4

N	P
0.0	100.0

Provides: RNDr. Katarína Štroffeková, PhD.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ BFSd/14	**Course name:** Biophysics seminar

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 credits: 1

Recommended semester/trimester of the course: 6.

Course level: III.

Prerequisities:

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

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

Brief outline of the course:
Scientific seminar in the field of Biophysics.

Recommended literature:
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:
Slovak and English.

Notes:

Course assessment
Total number of assessed students: 4

N	P
0.0	100.0

Provides: RNDr. Katarína Štroffeková, PhD.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ CB/14	**Course name:** Cell Biology

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

Number of credits: 7

Recommended semester/trimester of the course: 3.

Course level: III.

Prerequisities:

Conditions for course completion:
Individual work on a project.
Exam and completed individual project

Learning outcomes:
The aim of course is to enhance knowledge of doctoral students in biological processes underlying cellular and subcellular signalization and regulation. Furthermore, course goal is to introduce students to advanced multidisciplinary methods used to track cell signaling such as immunocytochemistry, flow cytometry, isolation and identification of proteins in combination with fluorescent microscopy.

Brief outline of the course:
1. Cell structure, function and signaling
Introduction (repetitorium in cell biology)
• Structure and function of membranes and organelles
Cell signaling related with cell survival and programmed cell death
2. Theoretical basics of cell cultivation and cell/proteins imaging methods
Routine methods in cell cultivation
Flow cytometry
Fluorescence Microscopy Fluorescence Microscopy
Proteins and Immunoassays
B) Practical training
• Cell cultivation
• Flow cytometry
• Fluorescence microscopy
• Protein isolation and imaging methods
C) Individual projects:
Individual research problems will be proposed to students for independent individual work in using a set of available experimental methods.

Recommended literature:

1. B. Alberts, D. Bray, A. Johnson, J. Lewis, M. Raff, K. Roberts and P. Walter: Essental Cell Biology, Garland Publishing, New York, USA, 1998, Czech translation: Základy bunečné biologie, Espero publishing, Ústi nad Labem
2. B. Alberts, D. Bray, A. Johnson, J. Lewis, M. Raff, K. Roberts and P. Walter: Molecular Biology of the Cell, fifth Edition, Garland Science 2008
3. Alice L. Givan: Flow Cytometry, first principles, second edition, Wiley, 2001
4. E. Newsholme and T. Leech: Functional biochemistry in Health and Disease, Wiley, 2009
5. Joseph R. Lakowicz: Principles of Fluorescence Spectroscopy, Third edition, Springer 2006
6. Otto S. Wolfbeis: Fluorescence methods and applications. Annals of NY Acad.Sciences 2008
7. Ewa M. Goldys: Fluorescence Applications in Biotechnology and the Life Sciences, 2009, Wiley-Blackwell
8. Sean R. Gallagher and Emily A. Wiley" Current Protocols Essential Laboratory Techniques. 2008, Wiley
9. Short Protocols in Molecular Biology Vol 1, 2, Fifth Edition 2002, Wiley

Course language:
Slovak and English

Notes:

Course assessment
Total number of assessed students: 7

N	P
0.0	100.0

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

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ BFB2/14	**Course name:** Cell Biophysics II
Course type, scope and the method: **Course type:** Lecture **Recommended course-load (hours):** **Per week: Per study period:** 28s **Course method:** present	
Number of credits: 5	
Recommended semester/trimester of the course: 1.	
Course level: III.	
Prerequisities:	
Conditions for course completion: Participation in problem solution (PBL); participation at the lectures. Exam.	
Learning outcomes: Introduction of students to basic knowledge regarding cell physiology and biophysics and their mechanisms.	
Brief outline of the course: Chemical components of cell. Cell metabolism and bioenergetics. Cell structure and function. Cell membrane – function, membrane transport. Role of proteins in membrane transport. Excitable cells – membrane potential, action potential. Cell organelles and their functions – Compartmentalization and protein transport within cell; intracellular transport of vesicles.	
Recommended literature: B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter: Molecular Biology of the Cell, Garland Science 2002 D.U. Silverthorn: Human Physiology – An Integrated Approach, Pearson/Benjamin Cummings 2010 R.M.J. Cotterill: Biophysics – An Introduction, J.Wiley & Sons,Ltd. 2002 G. Krauss: Biochemistry of Signal Transduction and Regulation, Wiley/VCH 2003 M.B. Jackson: Molecular and Cellular Biophysics, Cambridge Univ. Press 2006	
Course language: Slovak and English.	
Notes:	

Course assessment Total number of assessed students: 44	
N	P
0.0	100.0
Provides: prof. RNDr. Pavol Miškovský, DrSc., RNDr. Katarína Štroffeková, PhD.	
Date of last modification: 03.05.2015	
Approved: prof. RNDr. Pavol Miškovský, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ CM/04	**Course name:** Citation in monograph
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 1	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ CZC/04	**Course name:** Citation in scientific journal published abroad
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 10	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 25	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ CDC/04	**Course name:** Citation in scientific journal published in the country of residence
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	

abs	n
0.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SCI/04	**Course name:** Citation registered in Science Citation Index
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 65

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SMPR/04	**Course name:** Co-worker of project supported by international grant schemes
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 15	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 62	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SDPR/04	**Course name:** Co-worker of project supported by national grant schemes
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment

Total number of assessed students: 253

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ASD/14	**Course name:** Data analysis and statistical approaches to high dimensional data
Course type, scope and the method: **Course type:** Lecture **Recommended course-load (hours):** **Per week: Per study period:** 28s **Course method:** present	
Number of credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion: Student is obliged to complete hardcopy of the project according to teacher's request. For this project he obtains maximum 50 points, while another 50 points will be awarded for oral test. The minumum number of points needed to obtan mark A is 75. Credits are not granted to a student who obtains less than 30 points.	
Learning outcomes: Student obtaines the knowledge about the advanced methods of treatment of high dimensional data which can be met as outputs of the various physical experiments.	
Brief outline of the course: 1.The purpose of exploratíve analysis. High dimensional data and their format, the methods of data pre-processing, data standardizations. Theoretical and practical applications . The notion of dimension and metrics. 2.Cluster analysis.: k-means clustering, hierarchical clustering, fuzzy clustering. 3.The techniques of manifold learning – dimensionality reduction for the purpose of data visualisation and formulation of the scientific hypothesis.. Clarifying principles and methods of implementation of the method of principal components (PCA), factor analysis, dimensional scaling, locally linear embedding, Isomap, SOM networks. 4.Time series analysis.	
Recommended literature: 1. Y.Ma, Y.Fu, Manifold Learning Theory and Applications, CRC Press, 2011 2. J.A. Lee, M. Verleysen, Nonlinear Dimensionality Reduction, 2007 3. scientific papers	
Course language: slovak language and english language	
Notes:	

Course assessment Total number of assessed students: 1	
N	P
0.0	100.0
Provides: doc. RNDr. Denis Horváth, PhD.	
Date of last modification: 03.05.2015	
Approved: prof. RNDr. Pavol Miškovský, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ODZP/14	**Course name:** Defence of Doctoral Thesis
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 30	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 11

N	P
0.0	100.0

Provides:
Date of last modification: 03.05.2015
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/DZS/14	**Course name:** Doctoral Thesis Examination

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

Number of credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Obtaining required number of credits as given by the study plan.

Learning outcomes:
Evaluation of competences of the student according to his/her scientific profile.

Brief outline of the course:
Presentation of the results in the thesis for disertation exam, responding to referee´s comments, answering questions of exam committee. Two questions are selected subsequently from one compulsory and one optional subject, respectively. The subjects are selected by guarantee of the program according to the study plan and scientific profile of the student. The third question addresses the current state of work on dissertation thesis.

Recommended literature:

Course language:
english

Notes:

Course assessment
Total number of assessed students: 31

N	P
0.0	100.0

Provides:

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VPBP/04	**Course name:** Elaboration of reviewer report
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 18

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SAVEK/14	**Course name:** Electronics of Surfaces, Colloids and Biomolecules

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

Number of credits: 3

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Each student will prepare and present a presentation on a given topic (5 points) and take an oral examination in a form of discussion (5 points). If student gains less than 2 points in one part of the exam, she/he will not earn any credits.

Learning outcomes:
The graduate student will learn the state-of-the-art knowledge and methods of biophysics in the field of electrokinetic processes on membrane surfaces, colloids and biologically active molecules. The student will learn physico-chemical principles determining interactions at surfaces of biologically important systems, especially cell membranes. He/she will gain skills with processing and dissemination of complex knowledge in an expert community. He/she will be able to use this knowledge while working on the theme of dissertation.

Brief outline of the course:
Electric double layer at interfaces of solutions and surfaces. Surface charge and surface potential. Guy-Chapman-Stern theory. Electrokinetics and polarization of particles, colloids and membranes. Dielectrophoretic effects of solid particles and bioparticles. Monolayers, bilayers and micelles. Adsorption, solvation and dispersion.

Recommended literature:
1. AG Marschall: Biophysical Chemistry - vybrané kapitoly
2. D Myers: Surfaces, Interfaces, and Colloids

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: RNDr. Ivan Zahradník, CSc.

Date of last modification: 03.05.2015
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: CJP/ AJD1/07	**Course name:** English Language for PhD Students 1

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

Number of credits: 2

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 425

N	Ne	P	Pr	abs	neabs
0.0	0.0	67.53	0.0	32.47	0.0

Provides: PhDr. Helena Petruňová, CSc., Mgr. Zuzana Kolaříková, PhD.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: CJP/ AJD2/07	**Course name:** English Language for PhD Students 2

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

Number of credits: 3

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 421

N	Ne	P	Pr	abs	neabs
0.0	0.0	89.79	1.9	8.31	0.0

Provides: PhDr. Helena Petruňová, CSc., Mgr. Zuzana Kolaříková, PhD., Mgr. Barbara Mitríková

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SAVEMB/14	**Course name:** Excitability and Motility of Cells
Course type, scope and the method: **Course type:** Lecture **Recommended course-load (hours):** **Per week: Per study period:** 14s **Course method:** present	
Number of credits: 3	
Recommended semester/trimester of the course: 3.	
Course level: III.	
Prerequisities:	
Conditions for course completion: Each student will prepare and present a presentation on a given topic (5 points) and take an oral examination in a form of discussion (5 points). If student gains less than 2 points in one part of the exam, she/he will not earn any credits.	
Learning outcomes: The graduate student will learn the state-of-the-art knowledge and methods of biophysics in the field of cellular excitability and motility. The student will learn principles of the initiation and spreading of the excitation and of the movement activity at the membrane/molecular level and their phylogenesis at the cellular level. He/she will gain working skills with processing and dissemination of complex knowledge in an expert community. He/she will be able to use this knowledge while working on the theme of dissertation.	
Brief outline of the course: Permeability of membranes for ions and solutes, Nernst equation, Goldman - Hodgkin – Katz equation. Types of membrane transport: passive and facilitated diffusion, channels, transporters, active transport, pumps, exchangers. Initiation and spreading of nerve impulse, Hodgkin-Huxley model, nerve synapse, neuro-muscular endplate. Contractile proteins and microtubules, myosin motor, muscle cells, myofibrils, contraction-relaxation cycle, calcium signaling and energetics of contraction.	
Recommended literature: 1. DM Bers: Excitation-Contraction Coupling and Cardiac Contractile Force 2. AG Marschall: Biophysical Chemistry 3. N Sperelakis: Cell Physiology	
Course language: Slovak, English	
Notes:	

Course assessment Total number of assessed students: 4	
N	P
0.0	100.0
Provides: RNDr. Ivan Zahradník, CSc.	
Date of last modification: 03.05.2015	
Approved: prof. RNDr. Pavol Miškovský, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DKZU/04	**Course name:** Home Conference with Foreign Participation
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 4	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 150

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ NEM/04	**Course name:** Implementation of new experimental methodology
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 15	
Recommended semester/trimester of the course: 8.	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 52	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ MK/04	**Course name:** International Conference
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 6	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 233	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZNC/04	**Course name:** Journals not registered in the Current Contents Connect database and published abroad
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 34	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DNC/04	**Course name:** Journals not registered in the Current Contents Connect database and published in the country of residence
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 8

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZKC/04	**Course name:** Journals Registered by Current Contets Database
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 208

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DKC/04	**Course name:** Journals registered in the Current Contents Connect database and published in the country of residence
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 15	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 6

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ MMB/14	**Course name:** Methods of Molecular Biology

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

Number of credits: 5

Recommended semester/trimester of the course: 3.

Course level: III.

Prerequisities:

Conditions for course completion:
Six written and electronic exercises regarding course work within duration of the course

Learning outcomes:
Students will be able to analyze DNA and protein sequences. Further, they will be able to compare and predict protein characteristics at the level of primary and secondary structure. Students will be able to design primers and mutations for protein cDNA.

Brief outline of the course:
Analysis of recombinant DNA molecules, electrophoresis, antibody protein detection, description and techniques of gene manipulation (mutations and genetic diseases).

Recommended literature:
B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walter: Molecular Biology of the Cell, Garland Science 2008 (Fifth Ed.)
Current Protocols in Molecular Biology, Wiley publishers.
Mac Vector 11.0 softwer Manual
http://www.ncbi.nlm.nih.gov
http://www.ncbi.nlm.nih.gov/pubmed
http://www.ncbi.nlm.nih.gov/sites/gquery
http://blast.ncbi.nlm.nih.gov/Blast.cgi
http://www.cybertory.org/exercises/primerDesign/index.html
http://www.fermentas.com/templates/files/tiny_mce/media_pdf/3_PCR_Troubleshooting.pdf
http://igene.invitrogen.com/products/selector/vectors
http://www.genomics.agilent.com
http://www.origene.com/cdna/
http://www.rcsb.org/pdb/home/home.do
http://www.rasmol.org/software/RasMol_2.7.4/

Course language:
Slovak and English.

Notes:

Course assessment Total number of assessed students: 17	
N	P
0.0	100.0
Provides: doc. RNDr. Erik Sedlák, PhD., RNDr. Katarína Štroffeková, PhD.	
Date of last modification: 03.05.2015	
Approved: prof. RNDr. Pavol Miškovský, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ MBF2/14	**Course name:** Molecular Biophysics II

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

Number of credits: 5

Recommended semester/trimester of the course: 1.

Course level: III.

Prerequisities:

Conditions for course completion:

Learning outcomes:
The aim of the course is deepen and actualize the knowledge from the molecular biophysics with emphasis on the structure and dynamics of the most important biomacromolecules (nucleic acids, proteins, biomembranes) as well as the processes of molecular associations and recognition.

Brief outline of the course:
Intra- and inter-molecular interactions in biological systems. Conformations of biomacromolecules. Theoretical approaches to the study of biomolecular conformations. Function and structure of nucleic acids. Polymorphism and flexibility of DNA. Conformations of proteins. Analysis of the secondary, tertiary and quaternary structures of polypeptides. Dynamics of the biopolymers. The conformational transitions-helix-coil transition in DNA, denaturation of proteins, phase transitions in biomembranes. Kinetics of the conformational changes. Hydratation of nucleic acids and proteins. Biopolymers as polyelectrolytes. Polyelectrolytic solutions and Debye-Huckel theory. Models in molecular biophysics (Poisson-Boltzman equation, Tanford-Kirkwood model, the Monte Carlo method). Intermolecular associations. Allosteric interactions. Mechanisms and specificity of molecular recognition. Formation of subcellular structures.

Recommended literature:
1. M.B. Jackson, Molecular and cellular biophysics, Cambridge University Press, 2006.
2. M. Daune, Molecular biophysics-Structures in motion, Oxford University Press, 2004.
3. R. Glaser, Biophysics, Springer Verlag, 2001.
4. C.R. Cantor and P.R. Schimmel, Biophysical chemistry I-III, Freeman and Co., 1980.
5. W. Hoppe and W. Lohmann, Biophysics, Springer Verlag, 1986.
6. M.V. Volkenstein, Biofizika, Nauka, Moskva, 1988.

Course language:

Notes:

Course assessment Total number of assessed students: 41	
N	P
0.0	100.0
Provides: doc. Mgr. Daniel Jancura, PhD.	
Date of last modification: 03.05.2015	
Approved: prof. RNDr. Pavol Miškovský, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SAVMB/14	**Course name:** Molecular Biophysics of Cells

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

Number of credits: 3

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
During the semester the student will prepare a written thesis/presentation (40 points) and take an oral examination (40 points). If student gains less than 20 points, she/he will not earn any credits.

Learning outcomes:
The graduate student will gather knowledge on novel findings and methods of molecular biophysics with accent on ion channels, calcium homeostasis and cell energetics. The student will learn the biophysical principles of ion homeostasis, ion transport, and of function of selected enzymes. He/she will learn to work actively with scientific literature. He/she will be able to actively use this knowledge in research relating to the topic of his/her PhD thesis/

Brief outline of the course:
Types of ion channels in the cell: voltage-dependent K+, Na+, Ca2+, Cl- channels, methods of measuring the activity of ion channels; the patch clamp technique;, Ca2+-dependent ion channels: ryanodine receptor, IP3R channel; excitation-contraction coupling in the cell; mitochondrial membrane and its ion channels; apoptosis.

Recommended literature:
B. Hille: Ionic channels of excitable membranes, Sinauer Associates, 2001
B. Sakmann, E. Neher: Single-channel recording, Springer, 2009
Kolektív: Biomembrány. Ústav molekulárnej fyziológie a genetiky SAV, 2010
B. Alberts: Molecular Biology of the Cell

Course language:
English, Slovak

Notes:

Course assessment
Total number of assessed students: 8

N	P
0.0	100.0

Provides: Ing. Alexandra Zahradníková, DrSc.

Date of last modification: 03.05.2015
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ MSIM/14	**Course name:** Molecular Simulations

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: Per study period: 30s / 20s
Course method: present

Number of credits: 8

Recommended semester/trimester of the course: 2.

Course level: III.

Prerequisities:

Conditions for course completion:
Individual work on a project.
Exam and completed individual project

Learning outcomes:
The aim of the course is to refresh the theoretical knowledge as well as to provide the frequentant practical experience with the advanced theoretical and computational methods of characterization of complex biological systems. The course will provide a glimpse into the current progress in the filed, which opens new possibilities of detailed characterization of molecules and events within living cells, especially under physiological conditions. The course is aimed especially toward students specializing on more traditional, atomistic levels of description of biological systems, and is built gradually from ab initio principles up to phenomenological descriptions. Theoretical lectures will be accompanied by extensive hands-on exercises.

Brief outline of the course:
Lectures:
Molecular quantum chemistry – repetitorium. Computational estimations of experimental observables.
Molecular mechanics and modeling.
Mezoscopic approaches.
Exercises:
1. Molecular quantum chemistry
2. Molecular mechanics and modeling
Project:
Project on given microtheme.

Recommended literature:
1. Andrew Leach, Molecular Modelling: Principles and Applications, 2nd ed. (Prentice Hall, 2001).
2. Alan Hinchliffe, Molecular Modelling for Beginners, 2nd ed. (Wiley, 2008).
3. M. P. Allen and D. J. Tildesley, Computer Simulation of Liquids (Oxford University Press, USA, 1989).
4. Scientific papers for actual methods not covered in textbooks.

5. practical exercises: manuals (software suite Schrödinger - Maestro, Jaguar, Desmond; Gaussian 03; MDynaMix etc.)

Course language:

Notes:

Course assessment
Total number of assessed students: 10

N	P
0.0	100.0

Provides: doc. RNDr. Jozef Uličný, CSc.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DK/04	**Course name:** National Conference
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 76

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ NZ/04	**Course name:** Non-reviewed collections of papers and monographs published abroad or in the country of residence
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 57	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ FZL/14	**Course name:** Physiology

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

Number of credits: 7

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Individual work on a project.
Exam and completed individual project

Learning outcomes:
The aim of course is to enhance knowledge of doctoral students in biophysical processes underlying cellular and subcellular signalization and regulation. Furthermore, course goal is to introduce students to advanced multidisciplinary methods used to track cell signaling such as immuno-cytochemistry and electrophysiology in combination with fluorescent microscopy to track proteins of interest.

Brief outline of the course:
Introduction (repetitorium in cell physiology and biophysics). Signal transduction. Excitability and mobility of cell. Apoptosis.
B) Practical training
LAB1: Physiological responses to apoptotic signals in cells.
Methods: Cell cultures, Immunocytochemistry, Confocal microscopy
LAB2: Changes in ion channel functions as a result of apoptotic signal.
Methods: Cell cultures, electrophysiology – whole cell patch clamp, fluorescence microscopy
C) Individual projects:
Individual research problems will be proposed to students for independent individual work in using a set of available experimental methods.

Recommended literature:
1. Alberts B. et al. (2008) Molecular Biology of the Cell. (Fifth Ed.)
2. Silverthon et al. (2010) Human Physiology - An Integrated Approach (Fifth Ed.).
3. Newsholme E.A. & Leech T.R. (2009) Functional Biochemistry in Health and Disease.
4. Reed S. (2009) Essential Physiological Biochemistry
5. Nelson J. (2008) Structure and Function in Cell Signaling
6. Hille B. (2001) Ion Channels of Excitable Membranes (3rd Ed.)
7. Diederich M. (2009) Natural Compounds and Their Role in Apoptotic Cell Signaling Pathways

Course language:

Notes:	
Course assessment Total number of assessed students: 1	
N	P
0.0	100.0
Provides: Ing. Alexandra Zahradníková, DrSc., RNDr. Katarína Štroffeková, PhD., RNDr. Ivan Zahradník, CSc.	
Date of last modification: 03.05.2015	
Approved: prof. RNDr. Pavol Miškovský, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VYS/04	**Course name:** Presentation in Seminar
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 206	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ PING/14	**Course name:** Protein Engineering

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

Number of credits: 5

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
seminar work, test

Learning outcomes:
Provide basic knowledge about protein engineering.

Brief outline of the course:
1. DNA: Structure and function; Basic techniques in gene analysis
2. Vectors; Polymerase chain reaction
3. Creating mutations
4. Structure of proteins
5. Posttranslation modifications of proteins; Glycosylation
6. Protein production and purification
7. Preparative refolding
8. Evolution methods
9. Expression of proteins in eukaryotic cells

Recommended literature:
Analysis of genes and genomes, Richard j. Reece, 2004, John Wiley & Sons Ltd
…and reprints from scientific journals

Course language:
Slovak, English

Notes:

Course assessment
Total number of assessed students: 5

N	P
0.0	100.0

Provides: doc. RNDr. Erik Sedlák, PhD.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ RZ/04	**Course name:** Reviewed Proceedings
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 84

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SSOL/04	**Course name:** Self-motivated Study on Scientific Literature
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 127

N	P
0.0	100.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ CSIM/14	**Course name:** Simulations and Optimizations of Complex Biosystems

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: Per study period: 30s / 20s
Course method: present

Number of credits: 7

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Individual work on a project.
Exam and completed individual project

Learning outcomes:
The aim of the course is to provide fresh theoretical knowledge, as well as practical experience with advanced theoretical and computational methods applied to complex biological systems. The course will refresh existing knowledge and provide an overview of the recent development in the area, providing new possibilities of characterization of biological processes, especially under physiological conditions. The core of the course is based on top-down characterization, based on high-throughput experimental data and effective computational treatment based on phenomenological approaches. Theoretical lectures will be accompanied by extensive hands-on exercises.

Brief outline of the course:
Lectures:
Simulation and optimization techniques
Stochastic processes in physics, chemistry and biology. Statistical description of the features of complex systems. Modeling and simulation of complex systems. Stochastic optimization techniques.
Modeling in systems biology
Essentials of molecular biology, genomics, proteomics and bioinformatics (experimental data sources). Molecura reaction networks. High-throughput experiments and data (mass spectrometry, microarrays). Modeling of complex systems, methods of artificial intelligence, datamining.
Exercises:
1. Computer implementation of cellular automata
2. Parallel implementation of genetic algorithms
3. Construction and simulation of molecular reaction networks
Project:
Individual project on given microtheme.

Recommended literature:
1. van Kampen, N.G, Stochastic processes in physics and chemistry, Elsevier, 2001

2. Binder, K, and Heermann, D. W. Monte Carlo simulation in statistical physics, Springer, 2002
3. Barabasi, A.L, and Stanley, H.E, Fractal concepts in surface growth, Cambridge University Press, 199
4. Morrison, R. W, Designing evolutionary algorithms for dynamic environments, Springer, 2004
5. Ilachinski, A, Cellular automata, World Scientific, 2002
6. Uri Alon, An Introduction to Systems Biology: Design Principles of Biological Circuits, 1st ed. (Chapman and Hall/CRC, 2006).
7. A. Malcolm Campbell and Laurie J. Heyer, Discovering Genomics, Proteomics and Bioinformatics, 2nd ed. (Benjamin Cummings, 2006).
8. Scientific papers for actual methods not covered in textbooks.

Course language:

Notes:

Course assessment
Total number of assessed students: 1

N	P
0.0	100.0

Provides: doc. RNDr. Jozef Uličný, CSc., RNDr. Branislav Brutovský, CSc.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SAVSMB/14	**Course name:** Special Methods of Biophysics

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

Number of credits: 3

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
During the semester there will be two written tests, each worth 30 points. Students who do not obtain at least 20 points will not get credit.

Learning outcomes:
An overview of possibilities of EPR spectroscopy in biological systems, spin probes, radical interactions and detection of free radicals.
2. An overview of possibilities of NMR spectroscopy in biological systems, structure of molecules, spectroscopy and imaging.
3. An overview of possibilities of fluorescent spectroscopy in biological systems, detection of calcium concentration and other ions and pH.
4. Measurement of electrical properties of membrane channels in bilayer lipid membranes.

Brief outline of the course:
1. EPR spectroscopy
1.1. Basics of EPR
1.2. Basics of EPR spin probes
1.3. Use of EPR spin probes in biology
1.4.Basics of EPR spin traps
1.5. Use of EPR spin traps in biology
1.6. Visit of EPR spectroscopy laboratory at STU
2. NMR spectroscopy
2.1. Basics of NMR
2.2. In-vivo NMR - imaging
2.3. Use of NMR in biology
2.4. Visit of NMR spectroscopy laboratory at STU
3. Fluorescence spectroscopy
3.1.Basics of fluorescence
3.2. Fluorescence probes in biology
3.3. Detection of calcium ions in biological samples
4. Bilayer lipid membranes (BLM)
4.1. Preparation of BLM

4.2. Isolation of membrane vesicles from biological materials
4.3. Incorporation of vesicles into BLM and measurement of electrical properties of membrane channels
4.4. Demonstration of measurement of membrane channels in BLM.

Recommended literature:
1. Internet,
2. Internet-wikipedia
3. Jozef Holan a kolektív: Biofyzika pre lekárov. Osveta. 1982

Course language:
English

Notes:

Course assessment
Total number of assessed students: 5

N	P
0.0	100.0

Provides: RNDr. Karol Ondriaš, DrSc.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: Dek. PF UPJŠ/JSD/14	**Course name:** Spring School for PhD Students
Course type, scope and the method: **Course type:** Lecture **Recommended course-load (hours):** **Per week: Per study period:** 4d **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 68

abs	n
100.0	0.0

Provides: doc. RNDr. Vladimír Zeleňák, PhD.
Date of last modification: 03.05.2015
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZSP/04	**Course name:** Study Stay Abroad
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course: 6., 8.	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 148	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VPSV/04	**Course name:** Supervision of Student's Scientific Activity
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 6	
Recommended semester/trimester of the course: 6., 8.	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 10	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VBP/04	**Course name:** Supervisor/consultant of bacelor thesis
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 6	
Recommended semester/trimester of the course: 6., 8.	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 25	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PZS/14	**Course name:** Surface enhanced spectroscopy
Course type, scope and the method: **Course type:** Lecture / Practice **Recommended course-load (hours):** **Per week: Per study period:** 15s / 20s **Course method:** present	
Number of credits: 6	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities: ÚFV/MOS/14	
Conditions for course completion: Individual work on a project. Exam and completed individual project.	
Learning outcomes: Completing the course doctoral students will get knowledge about advanced techniques of vibrational spectroscopy and fluorescence.	
Brief outline of the course: Introduction to vibrational spectroscopy: Raman and infrared spectroscopy. Fluorescence. SERS – Surface-enhanced Raman spectroscopy (mechanisms, surfaces, applications). SEIRA – surface-enhanced infrared absorption (theory, experiment and applications). SEF – surface-enhanced fluorescence (theory, experiment and applications).	
Recommended literature: 1. Smith, W.E. and Dent, G.: Modern Raman Spectroscopy: A Practical Approach, John Wiley & Sons (2005), ISBN: 978-0471497943 2. Lakowicz, J. R.: Principles of Fluorescence Spectroscopy, 3rd ed., Springer Science + Business Media, LLC (2006), ISBN: 978-0-387-46312-4 3. Schlücker, S.: Surface Enhanced Raman Spectroscopy: Analytical, Biophysical and Life Science Applications, John Wiley & Sons (2013), ISBN: 978-3-527-63276-3 4. Le Ru, E. C. and Etchegoin, P. G.: Principles of Surface-Enhanced Raman Spectroscopy and related plasmonic effects, Elsevier (2009), ISBN: 978-0-444-52779-0 5. Aroca R.: Surface-Enhanced Vibrational Spectroscopy, John Wiley & Sons (2006), ISBN: 978-0-471-60731-1 6. Scientific manuscripts/papers.	
Course language: Slovak	
Notes:	

Course assessment
Total number of assessed students: 0

N	P
0.0	0.0

Provides: prof. RNDr. Pavol Miškovský, DrSc., RNDr. Gabriela Fabriciová, PhD., RNDr. Zuzana Jurašeková, PhD.

Date of last modification: 03.05.2015

Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SSB/14	**Course name:** Systems and synthetic biology

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: Per study period: 30s / 20s
Course method: present

Number of credits: 7

Recommended semester/trimester of the course:

Course level: III.

Prerequisities:

Conditions for course completion:
Presence at lectures and practical exercises, successful completion of given tasks

Learning outcomes:
The course will provide the student an overview of the fundamental assumptions, principles and tools of systems biology, relations to systems medicine as well as get glimpse of the actual state in this rapidly developing discipline.

Brief outline of the course:
Biopolymers as linear sequences. Sequence comparision, scoring matrix BLAS, FASTA and their use in bioinformatics. Sequence databases and illustrations of their use. Physical structure of biopolymers. Foldamers. Anfinsens principle and Levinthals paradox. Protein folding. Molecular dynamics and coarse-grain approaches. Molecular interaction networks and modeling of reaction kinetics. Application of graph approaches. Stochastic and deterministic modeling. High-throughput experiments and databases of results. Perspectives. Synthetic biology - actual state.

Recommended literature:
Actual literature recommended by lecturer.
Kitano, Hiroaki. Foundations of Systems Biology. Cambridge Mass.: MIT Press, 2001.
Campbell, A Malcolm - Heyer, Laurie J.. Discovering Genomics, Proteomics & Bioinformatics (2nd, 07) by Benjamin Cumings,
Alon, Uri. An Introduction to Systems Biology: Design Principles of Biological Circuits. Boca Raton, FL: Chapman & Hall/CRC, 2007.

Course language:

Notes:

Course assessment
Total number of assessed students: 1

N	P
0.0	100.0

Provides: doc. RNDr. Jozef Uličný, CSc.

Date of last modification: 03.05.2015
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PPC/04	**Course name:** Teaching activities
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 1	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 172

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PPC/04	**Course name:** Teaching activities
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 1	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 172	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ POVK/04	**Course name:** Work in Organizing Committee of Conference
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 50	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PDS/14	**Course name:** Writing Dissertation Work
Course type, scope and the method: **Course type:** **Recommended course-load (hours):** **Per week: Per study period:** **Course method:** present	
Number of credits: 15	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 32	

abs	n
100.0	0.0

Provides:
Date of last modification:
Approved: prof. RNDr. Pavol Miškovský, DrSc.