COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KFaDF/AFS/05	**Course name:** Ancient Philosophy and Present Times

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: 2.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 31

A	B	C	D	E	FX
80.65	6.45	6.45	0.0	6.45	0.0

Provides: Doc. PhDr. Peter Nezník, CSc.

Date of last modification: 24.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚINF/ AOS1/15	**Course name:** Administration of OS

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: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
To be able to install Linux based system, divide disks, to know how to install, configure and manage several network deamons.

Brief outline of the course:
1. Introduction to network services
2. SSH
3. Routing and NAT
4. Introduction to Firewall
5. Advanced firewall settings
6. DHCP server
7. Web server (apache, php, mysql)
8. Monitoring Server (SNMP, MRTG)
9. Samba Server
10. Mail server (smtp, imap, postfix)
11. Proxy server
12. Windows server
13. Windows Server II.
14. Introduction to Virtualization (Hyper-V OpenVZ)

Recommended literature:
1. Linux Documentation Project, 4 updated edition. Brno: Computer Press (2008).
2. Stanek, W.: Windows Server 2012 Inside Out. Microsoft Press (2013)
3. Shah, S. Soyinka, W. Administration Linux. Grade (2007)
4. Nemeth, E., et al.: Linux. Brno: Computer Press (2008)

Course language:

Course assessment
Total number of assessed students: 83

A	B	C	D	E	FX
51.81	24.1	6.02	4.82	7.23	6.02

Provides: RNDr. JUDr. Pavol Sokol, PhD., RNDr. PhDr. Peter Pisarčík
Date of last modification: 07.02.2017
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/APR/17	**Course name:** Astronomical instrumetation

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

Number of credits: 6

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities:

Conditions for course completion:
2 tests during semester. Each test for 15 points. Minimal amounts of points for an exam is 20. Oral examination and test.

Learning outcomes:
Acquaint students with construction of astronomical telescopes, correction of optical aberationss and light detectors in different spectral regions.

Brief outline of the course:
Principles of geometrical optics, optical errors and their corrections, types of telescopes and their construction, radio-telescopes, satellite UV and X-ray telescopes, detectors of the light: CCD, CMOS, principles of photometry, spectroscopy and polarimetry.

Recommended literature:
1. Howell : 2000, Handbook of CCD Astronomy, Cambridge University Press.
2. Cheng, J.: 2009, The Principles of Astronomical Telescope Design, Springer-Verlag
3. Lena et al.: 1996, Observational Astrophysics, Springer-Verlag
4. Martinez a Klotz: 1998, A practical giude to CCD Astronomy, Cambridge University Press.
5. Romano: 2009, Geometric Optics: Theory and Design of Astronomical Optical Systems Using Mathematica 6. Schroeder: 1999, Astronomical Optics, Academic Press

Course language:
Slovak, English

Course assessment
Total number of assessed students: 2

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

Provides: doc. Mgr. Štefan Parimucha, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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 credits: 5

Recommended semester/trimester of the course: 2.

Course level: 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.

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:

Course assessment
Total number of assessed students: 39

A	B	C	D	E	FX
74.36	10.26	12.82	0.0	2.56	0.0

Provides: doc. RNDr. Jozef Uličný, CSc.

Date of last modification: 24.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KFaDF/DF2p/03	**Course name:** History of Philosophy 2 (General Introduction)

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 credits: 4

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 734

A	B	C	D	E	FX
60.63	13.9	12.67	8.72	3.41	0.68

Provides: doc. PhDr. Pavol Tholt, PhD., mim. prof., Doc. PhDr. Peter Nezník, CSc., PhDr. Katarína Mayerová, PhD., doc. Mgr. Róbert Stojka, PhD.

Date of last modification: 24.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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 credits: 20

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:

Course assessment
Total number of assessed students: 40

A	B	C	D	E	FX
67.5	20.0	10.0	2.5	0.0	0.0

Provides:

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ EKF/04	**Course name:** Econophysics

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 credits: 4

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities:

Conditions for course completion:
Continuous evaluation is based on students' activity in the classroom and work on assignments. Examination

Learning outcomes:
To teach student to employ the aquired knowledge from physics in different disciplines such as economy and sociology.

Brief outline of the course:
Introduction. Pareto and Bachelier approach. The physical "philosophy" in the formulation of models of social and economic models. The system of measurable quantities in economy, the logarithmic price, the uints of time and price in economy. The stochastic models, random processess and distribution functions, stability of distributions, infinitely divisible process, scaling of distribution functions, Gauss and Lévy distribution, the simulation of random processes via computer. Selected parallels between economy and fluid turbulence, market volatility and intermittence. Correlations of markets, the markets in mutual correlations and anticorrelations. Autocorrelations and analysis of time series. Portfolio taxonomy and the strategy of the joining of enterprises and formation of corporations. Computer modeling of GARCH and ARCH random processes with variable dispersion of volatility. Models based on the stochastic diferential equations, Black-Scholes model of the rational option price.

Recommended literature:
1. An Introduction to Econophysics: Correlations and Complexity in Finance, R. N. Mantegna, H. E. Stanley, Cambridge University Press 2000.
2. The Statistical Mechanics of Financial Markets, J. Voit, Springer 2003.
3. Econophysics: An Introduction, Sitabhra Sinha, A. Chatterjee, A. Chakraborti, B. K. Chakrabarti, Wiley VCH 2011.

Course language:

Course assessment
Total number of assessed students: 16

A	B	C	D	E	FX
75.0	18.75	6.25	0.0	0.0	0.0

Provides: doc. RNDr. Milan Žukovič, PhD.
Date of last modification: 21.02.2017
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ESP1/13	**Course name:** Extrasolar Planets

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 credits: 3

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities:

Conditions for course completion:
semestral essay
oral exam

Learning outcomes:
Acquaint students wit problematic of exoplanets, their detections, formation and properties.

Brief outline of the course:
Definition of planets and exoplanets, known exoplanets, methods of their detection, protostelar disks and formations of planets, creation of giant planets and their dynamics in systems.

Recommended literature:
1. Barnes, R.:2010, Formation and Evolution of Exoplanets, Wiley-VCH
2. Cassen et al:2006, Extrasolar planets, Springer
3. Haswell C. A.: 2010, Transiting exoplanets, Cambridge University Press
4. Lena et al.: 2011, Observational Astrophysics, Springer-Verlag
5. Mason, J.: 2008, Exoplanets: Detection, Formation, Properties, Habitability, Springer
6. Perryman, M.: 2011, The Exoplanet Handbook, Cambridge University Press

Course language:
Slovak, English

Course assessment
Total number of assessed students: 7

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

Provides: doc. Mgr. Štefan Parimucha, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ FNT1/03	**Course name:** Low Temperature Physics

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

Number of credits: 6

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities:

Conditions for course completion:
Two tests during the semester. Final examination consists of the results of two tests and oral exam. The oral exam may be waived of if the tests results are better then D.

Learning outcomes:
The cours gives knowledge of methods and techniques used in low-temperature physics and information on basic physical properties of condensed matter at low temperatures.

Brief outline of the course:
Phase diagram of 4He. Thermal and transport propertie sof liquid helium-4. Superfluidity. Two-fluid model for superfluid He II. Hydrodynamics and thermodynamics for superfluid helium-4. Quantize vortices. Phase diagram of 3He. Order parameter. Properties of 3He-4He solutions. Quantum crystals. Superconductivity. Tunnel superconducting junctions. Application of superconductivity. Transport properties (electrical and thermal) of solids at low temperatures. Macroscopic quantum effects and mesoscopic systems. Specific heat of solids at low temperatures. Reaching low and very low temperatures. Thermometry. New problems of low-temperature physics.

Recommended literature:
A. Kent: Experimental low-temperature physics. Mac Millan Press Ltd., 1993.
D. S. Betts: An introduction to Milikelvin Technology. Cambridge University Press, 1989.
P. V. E. McClintok et al.: Low-Temperature Physics. Blackie, Galsgow and London 1992.
F. Pöbell: Matter an Methods at Low Temperatures. Springer - Verlag, Berlin, 1992

Course language:

Course assessment
Total number of assessed students: 46

A	B	C	D	E	FX
95.65	2.17	2.17	0.0	0.0	0.0

Provides: doc. RNDr. Erik Čižmár, PhD., Dr.h.c. prof. RNDr. Alexander Feher, DrSc.

Date of last modification: 24.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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 credits: 4

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
Examination

Learning outcomes:
To acquaint students with based problems of the phase transitions and critical phenomena.

Brief outline of the course:
Thermodynamics of phase transitions. Classification of phase transitions. Critical phenomena, universality. Microscopic models of the magnetic phase transitions. Ising model in one and two dimensions. Mean field theory of the Ising model. Landau theory of phase transitions.

Recommended literature:
1. Stanley H.G.: Introduction to Phase Transitions and Critical Phenomena, Clarendon Press Oxford, Oxford, 1971.
2. Reichl L.E.: A Modern Course in Statistical Physics, University of Texas Press, Austin, 1980.
3. Plischke M., Bergersen B.: Equilibrium Statistical Physics, World Scientific, Singapore, 1994.
4. Kadanoff L.P.: Statistical Physics, Statistics, Dynamics and Renormalization, World Scientific, Singapore, 2000.

Course language:
1. Slovak,
2. English

Course assessment
Total number of assessed students: 105

A	B	C	D	E	FX
60.95	11.43	11.43	11.43	4.76	0.0

Provides: prof. RNDr. Andrej Bobák, DrSc.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ FSL1/13

Course name: Solar Physics

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

Number of credits: 6

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
solved exercises
Exam

Learning outcomes:
To give students a comprehensive, physical 'up-to date' image of the sun from the deepest central area to the visible surface, solar atmosphere and the effects of the solar activity on the interplanetary space. To show an importance of the solar physics for understanding the evolution of stars and other areas of astrophysics.

Brief outline of the course:
Preliminary definitions and assumptions, basic facts about the sun, solar interior, solar atmosphere. magnetic fields and the dynamics of the Sun, The Standard Solar Model, solar activity, solar cycle.

Recommended literature:
Zirin, H., Astrophysics of the Sun, Cambridge Univ. Press, Cambridge, 1988
Physics of the Sun I. II. III. Geophysics and Astrophysics Monorgaphs, eds: P.A. Sturrock, T. E. Holzer, D.M. Mihalas, R.K. Ulrich, Riedel Publ. Dodrecht 1968
M. Stix: The Sun, An Introduction, Springer, 2nd edition, 2002.
E. R. Priest: Solar Magnetohydrodynamics, Reidel, 1982.
K. R. Lang: The Sun from Space, Springer, 2000.

Course language:
Slovak, English

Course assessment
Total number of assessed students: 9

A	B	C	D	E	FX
77.78	11.11	11.11	0.0	0.0	0.0

Provides: Mgr. Peter Gömöry, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ GEA1/13	**Course name:** Galactic and Extragalactic Astronomy

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 credits: 5

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities: ÚFV/TAF1/13

Conditions for course completion:
Seminar essay
Oral exam

Learning outcomes:
Acquaint students with the structure of our Galaxy, stellar streams and stellar statistics, galactic neighborhood, division of galaxies, their dynamic and evolution.

Brief outline of the course:
Determination of distances of the universe. Movement of the stars in Galaxy and Solar neighbouhood. Movement os the Sun in space. Stelar statistics. Structure of the Galaxy, subsystems, populations of the stars and spiral structure. Galaxies in universe, classification. Local group of galaxies, clusters of galaxies. Evolution of galaxies and large scale structure

Recommended literature:
1. Bertin a Lin: 1996, Spiral Structure in Galaxies, The MIT Press.
2. Combes et al.: 2003, Galaxies and Cosmology, Springer, Berlin
3. Harwitt: 1998, Astrophysical Concepts, Springer, Berlin
4. Mihalas: 1968, Galactic Astronomy, Freeman Publishing

Course language:
Slovak, English

Course assessment
Total number of assessed students: 9

A	B	C	D	E	FX
88.89	11.11	0.0	0.0	0.0	0.0

Provides: doc. Mgr. Štefan Parimucha, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KFaDF/IH2/03	**Course name:** Idea Humanitas 2 (General Introduction)

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: 3.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 8

A	B	C	D	E	FX
87.5	12.5	0.0	0.0	0.0	0.0

Provides: Doc. PhDr. Peter Nezník, CSc.

Date of last modification: 24.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KFaDF/ KDF/05	**Course name:** Chapters from History of Philosophy of 19th and 20th Centuries (General Introduction)

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: 2.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 10

A	B	C	D	E	FX
50.0	20.0	10.0	0.0	10.0	10.0

Provides: doc. PhDr. Pavol Tholt, PhD., mim. prof.

Date of last modification: 24.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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 credits: 2	
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:	

Course assessment

Total number of assessed students: 281

abs	n	z
98.22	1.78	0.0

Provides: Mgr. Ondrej Kalina, PhD., Mgr. Lucia Hricová, PhD.
Date of last modification: 16.02.2017
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚINF/ KKV1/15	**Course name:** Classical and quantum computations

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

Number of credits: 6

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

Course level: II.

Prerequisities:

Conditions for course completion:
Written work
Writen and oral examination

Learning outcomes:
To provide information on quantum computer and quantum computations. To compare classical and quantum models and methods.

Brief outline of the course:
The basics of classical theory of computation: Turing machines, Boolean circuits, parallel algorithms, probabilistic computation, NP-complete problems, and the idea of complexity of an algorithm. Introduction of general quantum formalism (pure states, density matrices, and superoperators), universal gate sets and approximation theorems. Grover's algorithm, Shor's factoring algorithm, and the Abelian hidden subgroup problem. Parallel quantum computation, a quantum analogue of NP-completeness, and quantum error-correcting codes.

Recommended literature:
1. BERMAN,G.P., DOOLEN,G.D., MAINIERI, R., TSIFRINOVIC, V.I. Introduction to Quantum Computers. World Scientific, 2003.
2. GRUSKA, J. Quantum Computing. McGraw-Hill, 1999.
3. JOHNSON, G. A Shortcut Through Time: The Path to the Quantum Computer, Knopf 2003.
4. KITAEV, A.Y., SHEN, A.H., VYALYI, M.N. Classical and Quantum Computation. American Mathematical Society, 2002.
5. NIELSEN, M.A., CHUANG, I.L. Quantum Computation and Quantum Information. Cambridge University Press, 2000.
6. HIRVENSALO, M., Quantum Computing, Springer 2004

Course language:

Course assessment
Total number of assessed students: 104

A	B	C	D	E	FX
23.08	35.58	14.42	14.42	8.65	3.85

Provides: doc. RNDr. Gabriel Semanišin, PhD., RNDr. Zuzana Bednárová, PhD.
Date of last modification: 07.02.2017
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ KOZM/13	**Course name:** Cosmology

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 credits: 4

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities:

Conditions for course completion:
Test within the curriculum presented during the course; seminar essay.
Oral exam with preparation; 3 questions within the curriculum presented during the course.

Learning outcomes:
Become acquainted with basic knowledge of fundamental cosmological theories, structure and evolution of the universe.

Brief outline of the course:
Structure and distribution of matter in the universe. Historical development of cosmological theories; Olbers' paradox; gravitational paradox. General theory of relativity; relativistic cosmology; other cosmological theories. The origin and evolution of the universe; cosmological problems.

Recommended literature:
1. Contopoulos, D. Kotsakis, Cosmology, the structure and evolution of the Universe, Springer, 1984;
2. Weinberg, S., Gravitation and Cosmology, Wiley, New York, 1971;
3. Narlikar, J.V., An Introduction to Cosmology, Cambridge University Press, Cambridge, 2002;

Course language:
Slovak, English

Course assessment
Total number of assessed students: 18

A	B	C	D	E	FX
94.44	0.0	5.56	0.0	0.0	0.0

Provides: doc. RNDr. Rudolf Gális, PhD., RNDr. Marián Jurčišin, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ KP/12	**Course name:** Survival Course
Course type, scope and the method: **Course type:** Practice **Recommended course-load (hours):** **Per week: Per study period:** 36s **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: I., II.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Course assessment Total number of assessed students: 329	

abs	n
47.11	52.89

Provides: MUDr. Peter Dombrovský, Mgr. Marek Valanský
Date of last modification: 23.02.2017
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ KTM/14	**Course name:** Quantum Theory of Magnetism

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 credits: 5

Recommended semester/trimester of the course: 3.

Course level: II., III.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:
The definition of basic lattice-statistical models in the quantum theory of magnetism. The one-dimensional quantum Heisenberg model, spin waves and the grounds of Bethe-ansatz method. Valence-bond-crystal ground states of the Majumdar-Ghosh and Shastry-Sutherland models. The one-dimensional quantum XY model in a transverse magnetic field, Jordan-Wigner fermionization and quantum critical points. The spin-wave theory, bosonization and Holstein-Primakoff transformation.

Recommended literature:
1. J. B. Parkinson, D. J. J. Farnell, An Introduction to Quantum Spin Systems, Lecture Notes in Physics 816 (Springer, Berlin Heidelberg, 2010).
2. U. Schollwock, J. Richter, D. J. J. Farnell, R. F. Bishop, Quantum Magnetism, Lecture Notes in Physics 645 (Springer, Berlin Heidelberg, 2004).
3. N. Majlis, The Quantum Theory of Magnetism (World Scientific, Singapore, 2000).

Course language:
EN - english

Course assessment
Total number of assessed students: 13

A	B	C	D	E	FX	N	P
7.69	38.46	15.38	7.69	15.38	0.0	0.0	15.38

Provides: doc. RNDr. Jozef Strečka, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ KTP1a/03	**Course name:** Quantum Field Theory I

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

Number of credits: 6

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities:

Conditions for course completion:
homeworks; their presentation and common analysis of problem under consideration, exam

Learning outcomes:
To offer basic knowledges about modern trends and theoretical methods in description of microword and phenomena in physical systems with infinite degrees of freedom.

Brief outline of the course:
Conception of relativistic quantum field. Particles as quantum fluctuations of this field. Lagrange formalism. Symmetries and related conservation laws for currents. Euler-Lagrange equations. Basic fields - scalar, spinor, electromagnetic and vector. Equations for free classical fields - Klein-Gordon and Dirac equations, Maxwell equations. Lagrangeans and Hamiltonians for these fields. Quantization of free fileds. Basic commutating and anticommutating relatios for free quantum fields.

Recommended literature:
Bogoljubov N.N., Širkov D.V.: Vvedenie v teoriu kvantovannych polej, Moskva, 1957 (prvé vydanie); Moskva, Nauka 1984 (4. Vydanie).
Bjorken J.D., Drell S.D.: Relativistic quantum fields (dva diely), McGraw-Hill, New York, 1966.
Feynmann R.P.: Photon-Hadron Interactions, Benjamin,New York, 1972; ruský preklad: Vzaimodejstvije fotonov s adronami, Mir, Moskva, 1975.

Course language:
slovak and english

Course assessment
Total number of assessed students: 54

A	B	C	D	E	FX
59.26	20.37	7.41	7.41	5.56	0.0

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

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ KTP1b/03	**Course name:** Quantum Field Theory II

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

Number of credits: 6

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities: ÚFV/KTP1a/03

Conditions for course completion:
homeworks, their presentation and common analysis of the problem under consideration; exam

Learning outcomes:
To offer basic knowledges about modern trends and theoretical methods in description of microword and phenomena in physical systems with infinite degrees of freedom.

Brief outline of the course:
Interacting fields. The principle of symmetry and the form of interactions of quantum fields. Lagrange operator in QED. S – matrix. Wick theorems and Feynman diagrams. Perturbative calculation of S - matrix. S - matrix and cross section of the processes. Compton scattering of the proton on electron cross section calculation in QCD frame. Radiation corrections and the divergences of the Feynman graphs. Running coupling constant.

Recommended literature:
Bogoljubov N.N., Širkov D.V.: Vvedenie v teoriu kvantovannych polej, Moskva, 1957 (prvé vydanie); Moskva, Nauka 1984 (4. Vydanie)
Itzykon C., Zuber J.B.: Quantum field theory,McGraw-Hill, New York, 1986; ruský preklad: Icikon K., Zjuber Z.B.: Kvantovaja teoria polja,
Mir, Moskva, 1984.
Ryder L.H.: Quantum field theory, Cambridge University Press, 1985; ruský
preklad: Rajder L.: Kvantovaja teoria polja, Mir, Moskva, 1987.

Course language:
slovak and english

Course assessment
Total number of assessed students: 51

A	B	C	D	E	FX
54.9	27.45	7.84	3.92	5.88	0.0

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

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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: Per study period:** 36s **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: I., II.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Course assessment Total number of assessed students: 126	

abs	n
45.24	54.76

Provides: Mgr. Peter Bakalár, PhD.
Date of last modification: 23.02.2017
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ MAG/08/08	**Course name:** Magnetochemistry

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 credits: 5

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

Course level: II.

Prerequisities:

Conditions for course completion:
Exam

Learning outcomes:
Introduction to the basic interactions in the electron subsystem of insulators, demonstration of the correlations between the structure and magnetic properties. Students will learn the basic standard methods used in the analysis of thermodynamic data (specific heat, susceptibility, magnetization) and EPR, since the study of magnetic properties yield an important information about the structure of material especially at low temperatures.

Brief outline of the course:
Electronic states in hydrogen atom, electronic configuration, term, multiplet. Paramagnetic and diamagnetic atoms. Atom in magnetic field: specific heat, susceptibility, magnetization and electron paramagnetic resonance (EPR). Atom in the crystal field. Freezing of angular momentum. Spin Hamiltonian. Termodynamics and EPR of paramagnetic atoms in the crystal field. Exchange and dipole interaction.Heisenberg Hamiltonian. Magnetic dimer. Long-range and short- range order. Low-dimensional magnets. Spatial anisotropy of exchange coupling. Exchange anisotropy. Heisenberg, Ising and XY model.

Recommended literature:
1.R.L. Carlin, A.J. Duyneveldt: Magnetic properties of transition metal compounds. New York, inc. Springer Verlag, 1977.
2. A.B.P.Lever, Inorganic electronic spectroscopy, Elsevier, Amsterdam, 1987.

Course language:
english

Course assessment
Total number of assessed students: 17

A	B	C	D	E	FX
52.94	23.53	11.76	5.88	5.88	0.0

Provides: doc. RNDr. Alžbeta Orendáčová, DrSc., RNDr. Róbert Tarasenko, PhD.

Date of last modification: 24.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ MKL/03	**Course name:** Magnetic Properties of Solids

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

Number of credits: 6

Recommended semester/trimester of the course: 2.

Course level: II., III.

Prerequisities:

Conditions for course completion:
Test.
Oral examination.

Learning outcomes:
To obtain a general view on basic magnetic phenomena, intrinsic magnetic properties of various magnetic materials, magnetization processes and domain structure.

Brief outline of the course:
Magnetic materials and magnetization. Magnetic quantities. Carriers of magnetic moment. Vector model of the atom. Magnetic field sources. Measurements of magnetic field. Diamagnetism. Paramagnetism. Ferromagnetism. Antiferromagnetism. Ferrimagnetism. Mgnetic behavior and structure of materials. Neutron diffraction. Magnetic anisotropy. Hall effect, magnetoresistance. Domain structure. Magnetostriction. Technical magnetization. Dynamic magnetization processes. Susceptibility. Thin films.

Recommended literature:
S. Chikazumi: Physics of Magnetism, Oxford University Press 2009
D. Jiles: Introduction to magnetism and magnetic materials, Chapman&Hall, London, New York, Tokyo, Melbourne, Madras, 1991

Course language:
english

Course assessment
Total number of assessed students: 91

A	B	C	D	E	FX	N	P
40.66	17.58	9.89	3.3	1.1	0.0	0.0	27.47

Provides: prof. RNDr. Peter Kollár, DrSc.

Date of last modification: 24.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ MPH1/13	**Course name:** Interpalnetary Matter

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

Number of credits: 6

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities:

Conditions for course completion:
test
Exam

Learning outcomes:
The knowledge on the physical and dynamic properties of asteroids, comets and meteors.

Brief outline of the course:
Asteroids, comets, meteors - discoveries, orbits, astrometry, photometry, mass, rotation and size, composition, collision with Earth, formation and evolution, space research, relationships and context.

Recommended literature:
J.S. Lewis: Physics and Chemistry of the Solar System, London, Academic Press, 1997 (kapitoly VI, VII, VIII).
Bottke, W.F., Cellino, A., Paolicchi, P., Binzel, R.P.: Asteroids III, Tucson, University of Arizona Press, 2002.
Brandt, J.C., Chapman, D.: Introduction to comets, Cambridge, Cambridge University Press, 2004.
Murad, E., Williams I.P.: Meteors in the Earth`s Atmosphere, Cambridge, Cambridge University Press, 2002.

Course language:
Slovak, English

Course assessment
Total number of assessed students: 7

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

Provides: doc. RNDr. Ján Svoreň, DrSc.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ MSSAA/14	**Course name:** Astronomy and Astrophysics

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: II.

Prerequisities: ÚFV/NME1/13 and ÚFV/NME2/13 and ÚFV/TAF1/13 and ÚFV/TAF2/13 and ÚFV/PHD/13 and ÚFV/ESP1/13 and ÚFV/MPH1/13 and ÚFV/FSL1/13

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

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:

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ MSSTF/14	**Course name:** Theoretical Physics

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: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 7

A	B	C	D	E	FX
57.14	0.0	28.57	14.29	0.0	0.0

Provides:

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚINF/ NEU1/15	**Course name:** Neural networks

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 credits: 5

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
To understand and to know using basic paradigms of neural networks.

Brief outline of the course:
Feed-forward and recurrent neural networks, back propagation algorithm to adaptation of neural networks, a capability of neural networks to be an universal approximator. Hopfield neural networks and solving optimization problems. Kohonen neural networks. Neural networks in connections to computational models. Theoretical problems of neural networks.

Recommended literature:
J. Hertz, A.Krogh, R.G. Palmer: Introduction to the theory of neural computation, Addison Wesley, 1991.
V. Kvasnička a kol.: Úvod do teórie neurónových sietí, IRIS, Bratislava, 1997.
J. Šíma, R. Neruda: Teoretické otázky neurónových sítí. Matfyzpress,MFF UK, Praha, 1996.

Course language:

Course assessment
Total number of assessed students: 199

A	B	C	D	E	FX
14.07	13.57	24.12	23.12	20.1	5.03

Provides: doc. RNDr. Gabriela Andrejková, CSc., RNDr. Ľubomír Antoni, PhD.

Date of last modification: 07.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/NME/17	**Course name:** Celestial mechanics

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

Number of credits: 7

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
2 tests in the range of calculated examples on the exercises each for 10 point. Minimal amounts of points for an exam is 10.
Oral exam

Learning outcomes:
Acquaint students with foundations of the celestial mechanics, solution of two body problem and its application to bodies of the Solar system and will learn to perform a numerical integration of orbits of "n" bodies.

Brief outline of the course:

Recommended literature:
1. Andrle P., Základy nebeské mechaniky. Academia, Praha, 1971
2. Boccaletti D., Pucacco G.: Theory of Orbits (Vol. 1 and Vol. 2), Springer, Berlin, 2001.
3. Brouwer D., Clemence G. M.: Methods of Celestial Mechanics, Academia Press, New York and London, 1961
4. Everhart E.: An efficient integrator that uses Gauss-RADAU spacings. In: Dynamics of Comets: Their Origin and Evolution, eds. A. Carusi and G. B. Valsecchi, Reidel, Dordrecht, pp. 185$-$202.
5. Puankare A.: Lekcii po nebesnoj mechanike. Nauka, Moskva, 1965.
6. Roy A. E., Orbital Motion, Adam Hilger Ltd., Bristol, 1978
7. Vanýsek V., Základy astronomie a astrofyziky, Academia, Praha, 1980.

Course language:
slovak, english

Course assessment
Total number of assessed students: 2

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

Provides: RNDr. Ľuboš Neslusan, CSc.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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 credits: 5

Recommended semester/trimester of the course: 1.

Course level: I., II.

Prerequisities:

Conditions for course completion:
Monitoring progress in solving applied projects.
examination (50%), quality of the project (50%)
examination

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.

Brief outline of the course:
Fundamentals of optimization theory. Basic optimization problems. Basic types of objective functions. Classification of optimization techniques. Gradient-based optimization techniques. Evolutionary algorithms. Genetic algorithms. Genetic algorithms as Markov processes. Statistical Mechanics Approximations of Genetic Algorithms. Monte Carlo simulation and simulated annealing. Swarm optimization. Cellular Automata and their applications in simulations of complex systems. Fractals. Agent-based models. Evolutionary games. Evolution of cooperation. Fundamentals of Neural Networks. Application of singular value decomposition to solve least squares problems.

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

Course language:

Course assessment
Total number of assessed students: 66

A	B	C	D	E	FX
66.67	18.18	7.58	3.03	4.55	0.0

Provides: RNDr. Branislav Brutovský, CSc.
Date of last modification: 24.02.2017
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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 credits: 5

Recommended semester/trimester of the course: 2.

Course level: I., II.

Prerequisities:

Conditions for course completion:
Presentation of the project in written form. Oral exam and discussion of the presented project.

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.

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:

Course assessment
Total number of assessed students: 39

A	B	C	D	E	FX
87.18	5.13	5.13	2.56	0.0	0.0

Provides: doc. RNDr. Jozef Uličný, CSc.

Date of last modification: 24.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ NPRa/10	**Course name:** Stochastic processes I

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 credits: 6

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities: ÚMV/VKP/10

Conditions for course completion:
To obtain at least 50% in written tests during the semester. Total evaluation based on written tests and oral exam.

Learning outcomes:
Student should obtain the knowledge about modelling of stochastic processes and the ability to apply theoretical knowledge in practical problems solving.

Brief outline of the course:
Stochastic (random) processes, their distributions and characteristics. Trajectory of the process. Classification of processes -homogenous,ergodic and stacionary process. Markov chains with discrete time, classification of states of the process. Evaluation of transitions, optimal strategies, Howard´s algorithm. Markov chains with continuous time, intensity of transition. Kolmogorov´s differential equations, methods of solutions. Poisson process. Birth-and-death processes. General linear process. Applications to queuing theory. Kendall´s classification of queuing systems, opened and closed systems, systems with waiting. Applications to renewal theory and reliability. Markov chains in discrete renewal models. Renewal process with continuous time. Limit theorems of renewal theory.

Recommended literature:
1. Skřivánková V.: Náhodné procesy a ich aplikácie, UPJŠ, Košice, 2004 (in Slovak)
2. Beichelt F.: Applied Probability and Stochastic Processes, 2nd Ed., Chapman and Hall, 2016
3. Stewart W.J.: Probability, Markov Chains, Queues, and Simulations, Princeton University Press, 2009
4. Janková, K. a kol. Markovove reťazce a ich aplikácie, epos, 2014 (in Slovak)
5. Prášková Z., Lachout P.: Základy náhodných procesu, MFF UK, Praha, 1998 (in Czech)

Course language:
Slovak

Course assessment
Total number of assessed students: 80

A	B	C	D	E	FX
7.5	16.25	25.0	28.75	20.0	2.5

Provides: doc. RNDr. Valéria Skřivánková, CSc., RNDr. Martina Hančová, PhD.
Date of last modification: 22.02.2017
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ NPRb/10	**Course name:** Stochastic processes II

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 credits: 6

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities: ÚMV/NPRa/10

Conditions for course completion:
Test and individual project work.
Exam

Learning outcomes:
To obtain knowledge of the stationary stochastic processes analysis in time domain and spectral domain.
To study properties of random processes with discrete time (time series) and continuous time and their application in finance.

Brief outline of the course:
1. Stationary precess, linear process, causal and invertible process.
2. Time domain analysis (autocovariance and partial autocovariance function)
3. Frequency domain analysis (spectral density and distribution function, periodogram)
4. Prediction of time series
5. Random processes with continuous time (fundamental concepts)
6. Brownian motion, Itô's process, Itô's lemma and its application
7. The Black-Scholes formula

Recommended literature:
1. Brockwell P., Davis R.: Introduction to Time Series and Forecasting, 3rd ed., Springer, New York, 2016
2. Prášková Z.: Základy náhodných procesů II, Karolinum, Praha, 2004 (in Czech)
3. Tsay R.: Analysis of Financial Time Series, 3rd ed., Wiley Interscience, New Jersey, 2010
4. Shumway R., Stoffer D.: Time Series Analysis and Its Applications with R Examples, 4th ed., Springer, New York, 2017
5. Melicherčík I., Olšarová L., Úradníček V.: Kapitoly z finančnej matematiky, Epos, Bratislava, 2005 (in Slovak)
6. Oksendal B.K.: Stochastic Differential Equations, 6th ed., Springer, 2014

Course language:
Slovak

Course assessment
Total number of assessed students: 61

A	B	C	D	E	FX
29.51	27.87	14.75	13.11	13.11	1.64
Provides: RNDr. Martina Hančová, PhD.					
Date of last modification: 22.02.2017					
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.					

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 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

Course assessment
Total number of assessed students: 15

A	B	C	D	E	FX
73.33	13.33	6.67	6.67	0.0	0.0
Provides: prof. RNDr. Michal Hnatič, DrSc., RNDr. Tomáš Lučivjanský, PhD.					
Date of last modification: 21.02.2017					
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.					

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/PAF/13	**Course name:** Summer Practice in Astrophysics

Course type, scope and the method:
Course type: Practice
Recommended course-load (hours):
Per week: Per study period: 7d
Course method: present

Number of credits: 5

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
Observation project.
On the basis of continuous assessment.

Learning outcomes:
The aim of the practice is gaining practical experience with the photometric and spectroscopic observations and data processing.

Brief outline of the course:
Practical photometric and spectroscopic observations of variable stars using telescopes and detectors at Observatory at Kolonica saddle. Reduction and analysis of the observational data and interpretation of obtained results.

Recommended literature:
1. Howell, S. B., Handbook of CCD Astronomy, Cambridge University Press, Cambridge, 2000;
2. Léna, P., Rouan, D., Lebrun, F., Mignard, F., Pelat, D., Observational Astrophysics, Springer-Verlag, Berlin, 1996;
3. Martinez P., Klotz A., A practical guide to CCD Astronomy, Cambridge University Press, Cambridge, 1998;

Course language:
Slovak, English

Course assessment
Total number of assessed students: 6

abs	n	z
100.0	0.0	0.0

Provides:

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ PAST/17	**Course name:** Computer astrophysics

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 credits: 5

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
Software project and its presentation. Oral examination

Learning outcomes:
Inform students of astronomy as well as other interested people about basic numerical methods used in astronomy and astrophysics, give them basic informations about problems of scientific writting and basic work with astronomical packages

Brief outline of the course:
Introduction to LaTex system., Sources of astronomical informations on web, VIZIER, NASA ADS Abstract Service. FITS format of astronomical data. Reduction of CCD and photoelectric photometry Introduction to MIDAS and IRAF. Numerical procedures for JD computation, stellar time, air mass, reduction of precession, nutation, aberation, refraction and proper motion. Heliocentric and barycentric correction of time and velocity. Period determination in astronomical data. Transformation of photometric systems and calibration of spectra. Minima times determinations.

Recommended literature:
1. Ghedini: 1982, Software for Photometric astronomy
2. Press et al., 1992, Numerical Recipes in C, The art of scientific Computing, CUP
3. manual for software packages 4. published papers and internet sources

Course language:
Slovak, English

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. Mgr. Štefan Parimucha, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ PHD/17	**Course name:** Variable and binary stars

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

Number of credits: 6

Recommended semester/trimester of the course: 1., 2..

Course level: II.

Prerequisities:

Conditions for course completion:
2 tests during term. Each test for 15 points. Minimal amounts of points for an exam is 20. Oral examination and test.

Learning outcomes:
Acquaint students with properties of variable stars, their distribution and basic characteristics, as well as give introduction to binaries, their observations and analysis of light curve and radial velocities.

Brief outline of the course:
Definition of variable stars and historical review, searching for variability and periodicity of variations. Classification of variable stars and basic parameters. Visual and spectroscopic binaries. Two body problem and orbital parameters. Roche model, mass exchange in binaries and eclipsing binaries. Period changes.

Recommended literature:
1. Egglecton: 2006: Evolutionary Processes in Binary and Multiple Stars, Cambridge University Press
2. Hilditch: 2001, Close binaries, Cambridge University Press
3. Kallrath J., Milone E.F.: 2009, Eclipsing Binary Stars - Modeling and Analysis, Springer
4. Lena et al.: 1996, Observational Astrophysics, Springer-Verlag
5. Roth G.: 1994, Compendium of Practical Astronomy, Springer-Verlag
6. Sterken a Jashek, 1996, Light Curves of variable Stars, Cambridge University Press
7. Warner: 1995, Cataclysmic Variables, Cambridge University Press

Course language:
Slovak, English

Course assessment
Total number of assessed students: 2

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

Provides: doc. Mgr. Štefan Parimucha, PhD.

Date of last modification: 21.02.2017
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ POF1b/99	**Course name:** Computational Physics II

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 credits: 4

Recommended semester/trimester of the course: 1.

Course level: I., II.

Prerequisities:

Conditions for course completion:
Continuous evaluation is based on students' activity in the classroom and work on assignments. Examination and assignments submitted electronically with the attached computer code.

Learning outcomes:
To teach students to create simulation projects to help to solve physical problems.

Brief outline of the course:
Advanced methods of Monte Carlo (MC) simulations of lattice spin systems. Local and cluster perturbation algorithms. Errors and histogram analysis of MC data. Reweighting by simple and histogram methods. Universality and finite-size scaling. Determination of order of phase transitions and calculation of critical exponents. Basics of quantum MC simulations. MC simulations of stochastic processes. Diffusion equation. Stochastic processes in financial analysis. Basics of molecular dynamics method.

Recommended literature:
1. D.P. Landau, K. Binder: A Guide to Monte Carlo Simulations in Statistical Physics, Cambridge University Press, 2000.
2. B.A. Berg: Introduction to Markov Chain Monte Carlo Simulations and Their Statistical Analysis, http://www.worldscibooks.com/etextbook/5904/5904_intro.pdf
3. W. Janke: Lectures on Ising model, http://www.physik.uni-leipzig.de/~janke/Ising_Lectures_Lviv.html

Course language:

Course assessment
Total number of assessed students: 47

A	B	C	D	E	FX
55.32	19.15	14.89	8.51	2.13	0.0

Provides: doc. RNDr. Milan Žukovič, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: Dek. PF UPJŠ/PPZ/13	**Course name:** Personality Development and Key Competences for Success on a Labour Market

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

Number of credits: 2

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

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 39

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

Provides: RNDr. Peter Stefányi, PhD.

Date of last modification: 13.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KPPaPZ/PPZMg/12	**Course name:** Psychology and Health Psychology (Master´s Study)

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 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:

Course assessment
Total number of assessed students: 226

A	B	C	D	E	FX
19.47	25.22	25.66	13.27	15.93	0.44

Provides: PhDr. Anna Janovská, PhD., Mgr. Lucia Hricová, PhD.

Date of last modification: 16.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/PRA/13	**Course name:** Practice in Astronomy

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 credits: 3

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities: ÚFV/APR/13

Conditions for course completion:

Learning outcomes:
Acquaint students with a basic reduction of photometric observations and with astrometric determination of position of objects.

Brief outline of the course:
Photometric observations, reduction and calibration, measurements of brightness of stars. Astrometric transformation, WCS system

Recommended literature:
1. Howell : 2000, Handbook of CCD Astronomy, Cambridge University Press.
2. Lena et al.: 1996, Observational Astrophysics, Springer-Verlag
3. Martinez a Klotz: 1998, A practical giude to CCD Astronomy, Cambridge University Press.

Course language:
Slovak, English

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: Mgr. Marek Husárik, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/PRAF/13	**Course name:** Practice in Astrophysics

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

Number of credits: 4

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities: ÚFV/TAF1/13

Conditions for course completion:
Continual valuation based on the partial fulfillment of tasks
Based on continual valuation.

Learning outcomes:
Acquaint students with a reduction of spectroscopical observations of the Sun and stellar objects.

Brief outline of the course:
Acquisition of spectra and their reduction, calibration, measurement of radial velocities and line's intensities, determination of the chemical composition of the atmosphere of the Sun and stars.

Recommended literature:
2. Appenzeller, I., Introduction to Astronomical Spectroscopy, Cambridge University Press, 2012

Course language:
Slovak, English

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: doc. Mgr. Štefan Parimucha, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚMV/ PSTb/10	**Course name:** Probability and statistics 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 credits: 5

Recommended semester/trimester of the course: 1.

Course level: I., II.

Prerequisities:

Conditions for course completion:
To obtain at least 50% in two written tests during the semester. Total evaluation based on written tests and oral exam.

Learning outcomes:
Student should obtain the knowledge about basic statistical methods and the ability to apply theoretical knowledge in practical problems solving.

Brief outline of the course:
Random vectors, their distributions and characteristics. Joint and marginal distributions. Correlation and regression, properties of correlation coefficient. Random sample, sampling distributions and characteristics. Some important statistics and their distributions. Point estimators and their properties. Maximum likelihood method. Interval estimates, confidence interval construction.Testing of statistical hypothesis, critical region, level of significance. Methods for searching optimal critical regions. Some important parametric and nonparametric tests.

Recommended literature:

1. Skřivánková V.: Pravdepodobnosť v príkladoch, UPJŠ, Košice, 2006 (in Slovak)
2. Skřivánková V.-Hančová M.: Štatistika v príkladoch, UPJŠ, Košice, 2005 (in Slovak)
3. CASELLA, G., BERGER, R., Statistical Inference, 2nd ed., Duxbury Press, 2002
4. DeGroot, M. H., Schervish, M. J.: Probability and Statistics, 4th ed., Pearson, Boston, 2012
5. Utts, J.M., Heckard, R.F.: Mind od Statistics, 5th ed., Thomson Brooks/Cole, 2014
6. Anděl J.: Základy matematické statistiky, MatfyzPress, Praha, 2011 (in Czech)

Course language:
Slovak

Course assessment
Total number of assessed students: 170

A	B	C	D	E	FX
20.0	20.59	18.24	24.12	11.18	5.88

Provides: RNDr. Martina Hančová, PhD.

Date of last modification: 22.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SPTFAa/14	**Course name:** Semestral Work I

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: 1.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 18

A	B	C	D	E	FX
94.44	5.56	0.0	0.0	0.0	0.0

Provides:

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SPTFAb/14	**Course name:** Semestral Work II

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: 2.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 18

A	B	C	D	E	FX
94.44	5.56	0.0	0.0	0.0	0.0

Provides: prof. RNDr. Michal Jaščur, CSc.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SPTFAc/14	**Course name:** Semestral Work III

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: 3.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 15

A	B	C	D	E	FX
86.67	0.0	13.33	0.0	0.0	0.0

Provides: prof. RNDr. Michal Jaščur, CSc.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/SPVKE/07	**Course name:** Social-Psychological Training of Coping with Critical Life Situations
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: 2.	
Course level: II.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Course assessment Total number of assessed students: 126	

abs	n	z
97.62	2.38	0.0

Provides: Mgr. Ondrej Kalina, PhD.
Date of last modification: 16.02.2017
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/SSA/13	**Course name:** Special Seminar in Astronomy

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 credits: 3

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
Seminar essay.
On the basis of continuous assessment.

Learning outcomes:
Inform students about recent results of astronomical and astrophysical research.

Brief outline of the course:
Recent discoveries in astrophysical research from domestic and world institutes, like exoplanets, cataclysmic variables, quasars, dark matter and dark energy.

Recommended literature:
Current papers in astronomical and astrophysical journals, internet.

Course language:
Slovak, English

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. RNDr. Rudolf Gális, PhD., doc. Mgr. Štefan Parimucha, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/SVK/13	**Course name:** Student Scientific Conference

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: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 30

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

Provides:

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ TAF1/13	**Course name:** Theoretical Astrophysics I

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

Number of credits: 6

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities:

Conditions for course completion:
2 written exams in the scope of problems solved during the course. More than half the number of points is required for continuous assessment.
Oral exam with preparation; 3 questions within the curriculum presented during the course.

Learning outcomes:
Become acquainted with knowledge about the structure and evolution of stars.

Brief outline of the course:
Properties of the stellar matter; the basic equations of stellar structure and the models of stars; sources of energy in stars; the origin, evolution and final evolutionary stages of stars.

Recommended literature:
1. Böhm-Vittense, E., Introduction to Stellar Astrophysics III, Stellar Structure and evolution, Cambridge University Press, Cambridge, 1989;
2. Kipenhahn, R., Weigert, A., Stellar Structure and evolution, Springer-Verlag, Berlin, 1990;
3. Hansen, C.J., Kawaler, S.D., Stellar Interiors – Physical Principles, Structure and Evolution, Springer-Verlag, New York, 1994;

Course language:
Slovak, English

Course assessment
Total number of assessed students: 9

A	B	C	D	E	FX
55.56	22.22	11.11	11.11	0.0	0.0

Provides: doc. RNDr. Rudolf Gális, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ TAF2/13	**Course name:** Theoretical Astrophysics II

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

Number of credits: 6

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities: ÚFV/TAF1/13

Conditions for course completion:
1 written exam in the scope of problems solved during the course. More than half the number of points is required for continuous assessment.
Oral exam with preparation; 3 questions within the curriculum presented during the course.

Learning outcomes:
Become acquainted with the basics of spectra formation in stellar atmospheres.

Brief outline of the course:
Basic concepts of physics of stellar atmospheres; energy transfer by radiation and convection. Continuous absorption coefficient; model of photosphere. Line absorption coefficient. Properties of spectral lines.

Recommended literature:
1. Tennyson, J., Astronomical spectroscopy, Imperial College Press, London, 2005
2. Gray, D.F., The observation and analysis of stellar photospheres, Cambridge University Press, Cambridge, 1992;
3. Böhm-Vitense, E., Introduction to stellar astrophysics II, Stellar atmospheres, Cambridge University Press, Cambridge,1997;

Course language:
Slovak, English

Course assessment
Total number of assessed students: 7

A	B	C	D	E	FX
71.43	28.57	0.0	0.0	0.0	0.0

Provides: doc. RNDr. Rudolf Gális, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ TKL1/99	**Course name:** Theory of Condensed Matter

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

Number of credits: 8

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities:

Conditions for course completion:
Successful passing of the final oral exam.

Learning outcomes:
To manage basic methods of quasiparticle formalism of Solid State Physics (electrons, phonons, electron-electron, electron-phonon interactions, magnons)

Brief outline of the course:
Born-Openheimer and Hartree-Fock aproximatins. The structure of solids and its theoretical description. The ideal crystal, direct and recipcal lattice. Brawaiss elementary cell. Electron in a periodic potential field, Bloch's theorem. Born-Karmán boundary conditions, Brillouin zones. Nearly free electron theory. Tight binding approximation. Existence of energy bands. Effective mass tensor. Lattice waves. Dynamical matrix. Linear monoatomic and diatomic lattices. Acoustic and optical modes. Phonons in solids. Electron-phonon interactions. The Fröhlich Hamiltonian. The atractive interaction between electrons.

Recommended literature:
[1.] Ch. Kittel: Quantum Theory of Solids, John Wiley & Sons Inc, 1985.
[2.] N.W. Ashcroft, N.D. Mermin: Solid State Physics, Harcourt College Publishers, 1976.
[3.] P.L. Taylor: A Quantum Approach to the Solid State, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1970.
[4.] J.M. Ziman, Principles of the Theory of Solids, University Press, Cambridge, 1972.
[5.] A.O.E. Animalu, Intermediate Quantum Theory of Crystalline Solids, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1981.

Course language:

Course assessment
Total number of assessed students: 80

A	B	C	D	E	FX
52.5	12.5	17.5	8.75	8.75	0.0

Provides: prof. RNDr. Michal Jaščur, CSc.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ TRV1/00	**Course name:** General Theory of Relativity

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 credits: 3

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
In the eighth week the test of the mathematical problem.
Individual report at the end of the semester.
Oral examination.

Learning outcomes:

Brief outline of the course:
Overview of the special theory of relativity (STR). Uniformly accelerated motion in STR. Local principle of equivalence - Eotvos experiment. Tensor calculus in pseudoriemann's metric. Einstein equations of gravitational field. Schwarzschild's solution for spherically symetric field. Experimental tests of the general theory of relativity. Black holes. Solutions for homogeneous and isotropic distribution of mass. Cosmological applications.

Recommended literature:
1. Hughston, L. P., Tod K. P.: An Introduction to General Relativity, London Mathenatical Society Student Texts 5. CUP, Cambridge, 1990.
2. Wald, R.W.: General Relativity, University of Chicago Press, Chicago, 1984.
3. Misner, C.W., Thorne, K.S., Wheller, J.A.: Gravitation, Freeman, San Francisco, 1973.
4. Landau L.D., Lifshitz E.M.: The classical theory of fields. Addison- Wesley, Reading, Mass., USA, 1977.

Course language:
1. Slovak,
2. English

Course assessment
Total number of assessed students: 87

A	B	C	D	E	FX
93.1	4.6	2.3	0.0	0.0	0.0

Provides: prof. RNDr. Andrej Bobák, DrSc., RNDr. Marián Jurčišin, PhD.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ TVKL/14	**Course name:** Transport properties of condensed matter

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 credits: 4

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
successful passing final exam

Learning outcomes:
To provide to students the basic knowledge about the theory of transport phenomena in solids. To teach students to apply theoretical knowledge for a description of real systems.

Brief outline of the course:
Occupation number representation. Second quantization for bosons and fermions. Equilibrium distribution of electrons in metals. Density of states. Boltzmann equation. Electrical conductivity. Galvanomagnetic phenomena. Thermal conductivity. Thermoelectric phenomena. Relaxation time and scattering processes. Electron-phonon interaction and scattering on acoustic phonons. Scattering on ionised impurity atoms. Superconductivity.

Recommended literature:
J. M. Ziman, Electron and Phonons: The Theory of Transport Phenomena in Solids,
Electrons and Phonons: The Theory of Transport Phenomena in Solids, Oxford (2001).

Course language:
slovak, english

Course assessment
Total number of assessed students: 2

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

Provides: RNDr. Pavol Farkašovský, DrSc.

Date of last modification: 24.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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 credits: 2

Recommended semester/trimester of the course: 1.

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

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 10457

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
88.25	0.0	0.0	0.0	0.0	0.02	7.81	3.92

Provides: Mgr. Peter Bakalár, PhD., Mgr. Dana Dračková, PhD., Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, Mgr. Zuzana Küchelová, PhD., PaedDr. Jana Potočníková, PhD., doc. PaedDr. Ivan Uher, PhD., Mgr. Marek Valanský, prof. RNDr. Stanislav Vokál, DrSc., Mgr. Aurel Zelko, PhD., Mgr. Marcel Čurgali, doc. PhDr. Ivan Šulc, CSc.

Date of last modification: 23.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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 credits: 2

Recommended semester/trimester of the course: 2.

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

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 9779

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
85.09	0.61	0.02	0.0	0.0	0.02	10.36	3.9

Provides: Mgr. Peter Bakalár, PhD., Mgr. Dana Dračková, PhD., Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, Mgr. Zuzana Küchelová, PhD., PaedDr. Jana Potočníková, PhD., doc. PaedDr. Ivan Uher, PhD., Mgr. Marek Valanský, prof. RNDr. Stanislav Vokál, DrSc., Mgr. Aurel Zelko, PhD., Mgr. Marcel Čurgali, doc. PhDr. Ivan Šulc, CSc.

Date of last modification: 23.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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 credits: 2

Recommended semester/trimester of the course: 3.

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

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 6188

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
89.66	0.03	0.0	0.0	0.0	0.0	4.36	5.95

Provides: PaedDr. Jana Potočníková, PhD., Mgr. Marcel Čurgali, Mgr. Peter Bakalár, PhD., Mgr. Dana Dračková, PhD., Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., Mgr. Marek Valanský, prof. RNDr. Stanislav Vokál, DrSc., Mgr. Aurel Zelko, PhD., doc. PhDr. Ivan Šulc, CSc.

Date of last modification: 23.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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 credits: 2

Recommended semester/trimester of the course: 4.

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

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 4644

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
85.66	0.32	0.04	0.0	0.0	0.0	6.61	7.36

Provides: Mgr. Marcel Čurgali, Mgr. Peter Bakalár, PhD., Mgr. Dana Dračková, PhD., Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, Mgr. Zuzana Küchelová, PhD., PaedDr. Jana Potočníková, PhD., doc. PaedDr. Ivan Uher, PhD., Mgr. Marek Valanský, prof. RNDr. Stanislav Vokál, DrSc., Mgr. Aurel Zelko, PhD., doc. PhDr. Ivan Šulc, CSc.

Date of last modification: 23.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ UEM/17	**Course name:** Úvod do exaktne riešiteľných modelov štatistickej fyziky

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 credits: 5

Recommended semester/trimester of the course: 4.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:
Exact solution for one-dimensional Ising models: combinatorial approach and transfer-matrix methods. Rigorous solution of the Ising model on Bethe lattices within exact recursion relations. Exact solution for one-dimensional classical Heisenberg model. Exact solutions for geometrically frustrated quantum Heisenberg models with the help of lattice-gas models, theory of localized magnons. Exact solutions for „six-vertex“ and „eight-vertex“ models, their equivalence with the Ising model.

Recommended literature:
1. R. J. Baxter, Exactly Solved Models in Statistical Mechanics (Academic, New York, 1982).
2. F. Y. Wu, Exactly Solvable Models: A Journey in Statistical Mechanics
(World Scientific, Singapore, 2008).
3. J. Strečka, Exactly Solvable Models in Statistical Physics, supportive textbook,
(ESF 2005/NP1-051 11230100466, Košice, 2008).

Course language:

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: doc. RNDr. Jozef Strečka, PhD.

Date of last modification: 01.03.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚINF/ UNS1/15	**Course name:** Introduction to neural networks

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 credits: 5

Recommended semester/trimester of the course: 1.

Course level: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
To understand and to know applications of basic paradigms of neural networks. To learn working with software for neural network models.

Brief outline of the course:
Basic models of computational units - neurons (linear threshold gates, polynomial threshold gates, perceptrons), their computational capability, algorithms of adaptations. Feed-forward neural networks, back propagation algorithm. Hopfield neural networks. ART neural networks. Using neural networks to solving of problems. Genetic and evolution algorithms.

Recommended literature:
J. Hertz, A.Krogh, R.G. Palmer: Introduction to the theory of neural computation, Addison Wesley, 1991
HASSOUN, M. H.: Fundamentals of artificial neural networks, The MIT Press, 1995

Course language:

Course assessment
Total number of assessed students: 393

A	B	C	D	E	FX
9.92	16.03	23.66	20.87	24.68	4.83

Provides: doc. RNDr. Gabriela Andrejková, CSc., RNDr. Ľubomír Antoni, PhD.

Date of last modification: 09.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/UPR/03	**Course name:** The Art of Aiding by Verbal Exchange

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: 4.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 49

A	B	C	D	E	FX
85.71	4.08	2.04	2.04	2.04	4.08

Provides: Mgr. Ondrej Kalina, PhD.

Date of last modification: 16.02.2017

Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.

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: Per study period:** 36s **Course method:** present	
Number of credits: 2	
Recommended semester/trimester of the course:	
Course level: I., II.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Course assessment Total number of assessed students: 15	

abs	n
26.67	73.33

Provides: Mgr. Alena Buková, PhD., Mgr. Agata Horbacz, PhD.
Date of last modification: 23.02.2017
Approved: Guaranteeprof. RNDr. Michal Jaščur, CSc.