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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ AJF1/08	**Course name:** Applied Nuclear Physics

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

Number of credits: 4

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities:

Conditions for course completion:
term project
examination

Learning outcomes:
Overview of possible applications of nuclear radiation.

Brief outline of the course:
Interaction of radiation with matter. Application of nuclear radiation, new trends in medicine. Biological effects of radiation, radiation dose units, basics for limits of exposure. Nuclear methods of structural analysis. Tracer techniques. Dating. Activation analysis.

Recommended literature:
1. Cooper J.R, Randle K., Sokhi R.S.: Radioactive releases in the environment, J.Wiley &Sons, Ltd. 2003
2. R. L. Murray, Nuclear Energy, An Introduction to th Concepts, Systems, and Applications of Nuclear Processes, 6th edition,Elsevier, 2009

Course language:
slovak and english

Course assessment
Total number of assessed students: 9

A	B	C	D	E	FX
66.67	22.22	11.11	0.0	0.0	0.0

Provides: RNDr. Janka Vrláková, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/CUVE/13	**Course name:** Ultra High Energy Particles

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: 1.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
The goal of the subject is to introduce the students to the physical matters of the high (over 10^15 eV) and ultra high (over 4.10^19 eV) cosmic rays. The lectures will concern the history of their observation, the principal of measurement, actual and future experiments, especially JEM-EUSO experiment (the first space-based experiment, which will observe from the International Space Station). The final lectures will review the principles of their propagation and acceleration in galactic and intergalactic space and discuss possible sources of origin.

Brief outline of the course:

Recommended literature:
Cosmic rays at Earth, P.K.F. Grieder, Elsevier Science B.V. 2001
Extensive Air Showers, P.K.F. Grieder, Springer-Verlag Berlin Heidelberg 2010
The JEM-EUSO mission, New Journal of Physics, Volume 11, Issue 6, pp. 065009, 2009
Web: http://jemeuso.riken.jp
Ultra High Energy Cosmic Rays: origin and propagation, Todor Stanev, ICRC'07 Merida
Origin and Propagation of Extremely High Energy Cosmic Rays, P.Bhattacharjee, arXiv:astro-ph/9811011

Course language:

Course assessment
Total number of assessed students: 3

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

Provides: RNDr. Pavol Bobik, PhD., RNDr. Marián Putiš, PhD., RNDr. Blahoslav Pastirčák, CSc.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DEJ1/99	**Course name:** History of Physics

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

Number of credits: 2

Recommended semester/trimester of the course: 2.

Course level: I., II.

Prerequisities:

Conditions for course completion:
written test and thesis
exam

Learning outcomes:
Basic facts in the history of physics.

Brief outline of the course:
Evolution of knowledge before Galileo. Evolution of physics within the mechanical picture of the world. Evolution and limits of classical physics, phase of breakthrough in physics. Origin and evolution of the theory of relativity. Quantum physics and prospects of further evolution of physics and their application. Contemporary state of physical research and its application in technology, natural sciences and philosophy. Position of physics in our society.

Recommended literature:
1. R.Zajac, J.Chrapan: Dejiny fyziky, skriptá, MFF UK, Bratislava, 1982.
2. V.Malíšek: Co víte o dějinách fyziky, Horizont, Praha, 1986.
3. I.Kraus, Fyzika v kulturních dějinách Evropy, Starověk a středověk, Nakladatelství ČVUT, Praha, 2006.
4. A.I.Abramov: Istoria jadernoj fiziky, KomKniga, Moskva, 2006.
5. L.I.Ponomarev: Pod znakom kvanta, Fizmatlit, Moskva, 2006.
6. I.Kraus, Fyzika v kulturních dějinách Evropy, Od Leonarda ke Goethovi, Nakladatelství ČVUT, Praha, 2007.
7. I.Kraus, Fyzika od Thaléta k Newtonovi, Academia, Praha, 2007.
8. I.Štoll, Dějiny fyziky, Prometheus, Praha, 2009.
9. www-pages.
10.Brandt S., The harvest of a century, Discoveries of modern physics in 100 episodes, Oxford, 2009.

Course language:

Course assessment
Total number of assessed students: 22

A	B	C	D	E	FX
81.82	9.09	9.09	0.0	0.0	0.0
Provides: prof. RNDr. Stanislav Vokál, DrSc.					
Date of last modification: 20.02.2017					
Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.					

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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ DPO/14	**Course name:** Diploma Thesis and its Defence

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

Number of 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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ EJF1a/04	**Course name:** Experimental Methods of Nuclear Physics

Course type, scope and the method:
Course type: Lecture / Practice
Recommended course-load (hours):
Per week: 4 / 1 **Per study period:** 56 / 14
Course method: present

Number of credits: 8

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities:

Conditions for course completion:
thesis
exam

Learning outcomes:
Acquire basic knowledges of the principles of particle detectors, construction of large detectors complex and basis of electronics in subnuclear physics.

Brief outline of the course:
Principles and construction of particle detectors: quantities characterizing detectors. Proportional chambers, MWPC. Drift chambers, TPC. Special types of gas detectors, MSGC. Silicon detectors (pixels/strips). Scintilators and photodetectors.
Methods of physical quantities measurement: Vertex detectors. Track detectors (measurement of coordinates, paths, angles, momenta). Charged particle identification (ionisation losses, time of flight ...). Calorimetry, electromagnetic and hadron calorimeters. Large detector systems, fixed target and collider experiments.
Basis of electronics used in subnuclear physics (fundamental concepts, principles, requirements, specialness).

Recommended literature:
Fernow R.: Introduction to experimental particle physics, Cambridge, 1986.
Grupen C.: Particle detectors, Cambridge, 1996
Kleinknecht K.: Detectors for particle radiation, Cambridge, 1986.
Bartke J.: Introduction to Relativistic Heavy Ion Physics, World Scientific Publishing, Singapore, 2009.

Course language:
slovak and english

Course assessment
Total number of assessed students: 21

A	B	C	D	E	FX
57.14	33.33	4.76	4.76	0.0	0.0

Provides: Ing. Jozef Černák, PhD., RNDr. Adela Kravčáková, PhD.
Date of last modification: 20.02.2017
Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ FEC1/04	**Course name:** Elementary Particle Physics

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:

Learning outcomes:
To obtain basic knowledge of particle physics which is necessary for quantum field theory and quantum chromodynamics.

Brief outline of the course:
Definition, sources and detection of elementary particles, relativistic kinematics, history of discoveries of elementary particles, basic experiments, quark model, particle classification, particle dynamics, electromagnetic interaction, strong and weak interaction, symmetries and conservation laws, parity, charge conjugation, CP symmetry, experiments with violation of spatial and combined symmetry, physics beyond the Standard Model.

Recommended literature:
1. D. Griffiths: Introduction to Elementary Particles, Wiley-VCH, 2008, ISBN 978-3-527-40601-2
2. A. Bettini: Introduction to Elementary Particle Physics, Cambridge University Press, 2008, ISBN 978-0-521-88021-3
3. B. Martin and G. Shaw: Particle Physcis, Wiley, 2008, ISBN 978-0-470-03293-0
4. D. Perkins: Introduction to High Energy Physics, Cambridge University Press, 2000, ISBN 978-0521621960

Course language:

Course assessment
Total number of assessed students: 21

A	B	C	D	E	FX
42.86	38.1	9.52	4.76	4.76	0.0

Provides: doc. RNDr. Marek Bombara, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/FJA1/14	**Course name:** Physics of the Nucleus

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: 1.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:
Basic properties of nucleus. Nuclear masses, binding energy, nuclear stability. Nuclear radius, density distribution of nuclear matter. Nuclear momentum and parity. Spin and magnetic momentum of nuclei. Quadrupole electric momentum. Theory of deuteron. Theory of scattering. Nuclear spin and isospin. Nuclear forces. Tensor character of nuclear forces.Models of atomic nucleus.

Recommended literature:
Preston M.A. , Physics of the Nucleus, Addison-Wesley Publishing Company, 1962

Course language:

Course assessment
Total number of assessed students: 44

A	B	C	D	E	FX
59.09	15.91	11.36	9.09	4.55	0.0

Provides: doc. RNDr. Jozef Urbán, CSc.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ IKTN/03	**Course name:** New Information and Communication Technologies

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: 3.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
Presentation of new information and communication technologies and their practical application in education, research activities as well as in popularisation of science.

Brief outline of the course:
Introduction to new trends od communications with voice and video using Internet (videoconferencing, webcasting, videostreaming,video on demand, distance learning etc.). Presentation and individual training.

Recommended literature:
http://www.vrvs.org
http://evo.caltech.edu
http://webcast.cern.ch
http://www-visualmedia.fnal.gov
http://www.slac.stanford.edu

Course language:

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: RNDr. Alexander Dirner, CSc., Ing. Jozef Černák, PhD., RNDr. František Franko, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/JADF/14	**Course name:** Nuclear 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: ÚFV/FEC1/04 and ÚFV/EJF1a/04 and ÚFV/FJA1/14 and ÚFV/KTP1a/03 and ÚFV/KTP1b/03

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
85.71	14.29	0.0	0.0	0.0	0.0

Provides:

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ JRE1/14	**Course name:** Nuclear Reactions

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: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
Term project
Examination

Learning outcomes:
Introduction to nuclear reactions.

Brief outline of the course:
Introduction to nuclear reactions. Conservation laws, kinematics, cross section, scattering theory. Mechanism of nuclear reactions. Direct nuclear reactions. Resonance reactions. Bohr model of nuclear reactions, compound nucleus. Plane wave Born approximation. Distorted wave Born approximation. Pre-compound model of nuclear reactions: cassade model, exciton model, fireball. Neutron physics. Neutron induced reactions. Heavy ion reactions. Gamma reactions. Nuclear synthesis. Fusion in the Sun and Stars, carbon cycle, proton cycle. Application of nuclear physics in medicine.

Recommended literature:
1. Bertulani C.A., Danielewicz P.: Introduction to nuclear reaction, IOP Publish. Ltd., 2004.
2. G. McCracken, P. Stott: Fusion, The Energy of the Universe, Elsevier 2005
3. P.A.Tipler, R.A.Llewellyn: Modern Physics, 6th Edition,W.H.Freeman and Company, 2012

Course language:
slovak and english

Course assessment
Total number of assessed students: 14

A	B	C	D	E	FX
64.29	28.57	0.0	7.14	0.0	0.0

Provides: RNDr. Janka Vrláková, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ KDO1/14	**Course name:** Methods of Clinical Dosimetry

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: 2.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
Basic methods of clinical dosimetry.

Brief outline of the course:
The basic concepts of clinical dosimetry and its radiotherapy applications. The sources of ionising radiation. The dose measurement methods. New trends in clinical dosimetry. PC supported topometry and dosimetry of beams ”in phantoms” and ”in vivo” dosimetry. 3D-figures (based on tomograph slices) on simulation methods and it’s using on radiotherapy.

Recommended literature:
1. Podorsak E.B..et al. : Radiation Oncology Physics , IAEA
2. Kahn F.M. The Physics of Radiation Therapy, Lippincott Williams and Wilkins

Course language:

Course assessment
Total number of assessed students: 3

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

Provides: doc. RNDr. Pavel Matula, CSc.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

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

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

Number of 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. Stanislav Vokál, DrSc.

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. Stanislav Vokál, DrSc.

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. Stanislav Vokál, DrSc.

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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ KZI1/03	**Course name:** Cosmic Rays

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:
Recherche work.
Final examination.

Learning outcomes:
To acquaint with the basic characteristics of cosmic rays.

Brief outline of the course:
Energetic particles in space. Origin of cosmic rays. Interaction of cosmic ray particles with the material.
Detectors of cosmic rays, X rays and gamma rays. Cosmic rays in the upper layers of the atmosphere.
Solar cosmic rays.
Modulation and production of cosmic rays in the heliosphere.
Influence of geomagnetic field on cosmic ray particles.
Acceleration mechanisms of cosmic rays.

Recommended literature:
1. M.S. Longair: High Energy Astrophysics: Volume 1, Particles, Photons and Their Detection, Cambridge University Press, Feb 27, 1992 - Science - 440 pages.
2. M. S. Longair. High Energy Astrophysics, Volume 2: Stars, the galaxy, and the interstellar medium. Cambridge, second edition, 1994.
3. T. K. Gaisser. Cosmic Rays and Particle Physics. Cambridge, 1990.
4. L. Miroshnichenko, Solar Cosmic Rays, Springer, 2015
5. L.I. Dorman: Cosmic Rays in the Earth's Atmosphere and Underground, Springer, 2004.
6. K. Kudela: On energetic particles in space, acta physica slovaca vol. 59 No. 5, 537 – 652, oct. 2009.

Course language:

Course assessment
Total number of assessed students: 30

A	B	C	D	E	FX
96.67	3.33	0.0	0.0	0.0	0.0

Provides: prof. Ing. Karel Kudela, DrSc.
Date of last modification: 20.02.2017
Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ LKSp/13	**Course name:** Summer Course-Rafting of TISA River
Course type, scope and the method: **Course type:** Practice **Recommended course-load (hours):** **Per week: 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. Stanislav Vokál, DrSc.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/PFC1/03

Course name: Selected Topics from Elementary Particle Physics

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

Number of credits: 4

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities: ÚFV/FEC1/04

Conditions for course completion:
2 x test
Examination

Learning outcomes:
Unified description of processes in nuclear and particle physics and selected experiments that lead to nuclear and nucleon substructures - to the quarks.

Brief outline of the course:
Nucleon-nucleon interactions at high and relativistic energies. Geometric shape of nuclei, nuclear formfactor. Elastic scattering of electrons on nucleons, formfactor of nucleons. Deep inelastic scattering and the structure of particles. Scaling and the parton model. Quark model, coloured quarks and gluons and strong interaction. Particle production in electron - positron collisions. Resonances. Baryons and mesons.

Recommended literature:
Perkins D.H.: Introduction to high energy physics, Cambridge, 2000.
Martin B., Shaw G.: Particle Physics, Wiley, 2008.
Martin B.R.: Nuclear and Particle Physics, Wiley, 2006.
Povh, Rith, Scholz, Zetsche: Particles and Nuclei, An Introduction to the Physical Concepts, Berlin, 1993.
Ryder L.H.: Elementary particles and symmetries, Routledge, 1975.

Course language:
slovak and english

Course assessment
Total number of assessed students: 16

A	B	C	D	E	FX
50.0	25.0	12.5	6.25	6.25	0.0

Provides: RNDr. Adela Kravčáková, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ PFJ1/13	**Course name:** Programming and Data Processing in Nuclear Physics 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: II.

Prerequisities:

Conditions for course completion:
semestral project

Learning outcomes:
To provide practical cookbook of the object oriented programming in C++

Brief outline of the course:
A practical introduction to the world of the object oriented programming, subset of the C++ and program development.

Recommended literature:
1. J.J. Barton, L.R. Nackman: Scientific and engineering C++, Addison Wesley, 1994
2. B. Kernigham, D. Ritchie: ANSI C
3. B. Eckel, Thinking in C++, 2nd ed., 2000
4. http://www.cplusplus.com/doc/tutorial

Course language:

Course assessment
Total number of assessed students: 9

A	B	C	D	E	FX
77.78	0.0	22.22	0.0	0.0	0.0

Provides: RNDr. Martin Vaľa, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ PJF2/13	**Course name:** Programming and Data Processing in Nuclear Physics 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: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
To teach the students how to analyse data using the ROOT framework and help them to gain practical skills with object-oriented programming language C++.

Brief outline of the course:
Basic description of ROOT environment, work with the basic tools for data processing: histograms and graphs, their creation and fitting, data storing into the structure suitable for analysis in ROOT - trees, working with trees.

Recommended literature:
1. http://www.cplusplus.com/doc/tutorial/
2. http://www-root.fnal.gov/root/CPlusPlus/index.html
3. http://root.cern.ch/drupal/content/users-guide

Course language:

Course assessment
Total number of assessed students: 9

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

Provides: doc. RNDr. Marek Bombara, PhD., RNDr. Marián Putiš, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ PPA/07	**Course name:** Data Analysis Tools

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: 4

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
solving partial tasks
semestral projects

Learning outcomes:
To provide the students with OS UNIX and programming language C,C++.

Brief outline of the course:
Operating system UNIX. Programming language C and the bases of C++ for physicists. Advanced methods of programming in C++. ROOT - An Object Data Analysis Framework. Programming in ROOT environment.

Recommended literature:
Hans Petter Langtangen, A Primer on Scientific Programming with Python, Springer 2009
Shai Vaingast, Beginning Python visualization, Apress 2009
Ajay D. Kshemkalyani, Mukesh Singhal, Distributed computing: principles, algorithms, and systems
Cambridge Univ. Press 2008
Lee Gillam, Cloud Computing: Principles, Systems and Applications, Springer 2010

Course language:

Course assessment
Total number of assessed students: 5

A	B	C	D	E	FX
60.0	0.0	0.0	0.0	20.0	20.0

Provides: RNDr. Alexander Dirner, CSc., Ing. Jozef Černák, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

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. Stanislav Vokál, DrSc.

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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/PSD/14	**Course name:** Introduction to distributed data processing

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: 2.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
Introductory lectures to basics of parallel data processing on analysis farms.

Brief outline of the course:
Basics of scripting languages under various operating systems
Scripting in Unix/Linux
Simple parametrization of jobs on analyses farms
Basic principles of batch farm organizations
Basic principles of interactive farm organizations
Implementation and realization of job paralelization

Recommended literature:
https://www.gnu.org/software/bash/
http://www.adaptivecomputing.com/products/open-source/torque/
http://root.cern.ch/drupal/
http://xrootd.org/
https://eos.readthedocs.org/en/latest/

Course language:
English

Course assessment
Total number of assessed students: 2

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

Provides: doc. RNDr. Jozef Urbán, CSc., RNDr. Martin Vaľa, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ RJF1/14	**Course name:** Relativistic Nuclear Physics

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

Number of credits: 4

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
Introduction to nuclear interactions at relativistic energies.

Brief outline of the course:
Basic parametres and quantities of particle collisions at high energies. Relativistic kinematics, invariants, rapidity and light cone variables. Basic parametres of high energy nuclear collisions, energy thresholds, the velocity or sound, cross sections, spectators and participants, temperature, thermal and transverse spectra, collision volume. Glauber model for hadron-nucleus and nuclear collisions. The equation of state for nuclear matter. The quark-gluon plasma.

Recommended literature:
Lovhoiden G.: Heavy Ion Collisions at High Energies, Skriptá, Oslo-Bergen, 1996.
Chenk-Yin Wong: Introduction to High-Energy Heavy Ion Collisions, World Scientific, 1994.
Nikitin Ju.P., Rozentaľ I.L.: Jadernaja fizika vysokych energij Moskva, Atomizdat, 1980.

Course language:

Course assessment
Total number of assessed students: 23

A	B	C	D	E	FX
52.17	17.39	17.39	0.0	13.04	0.0

Provides: doc. RNDr. Jozef Urbán, CSc.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SEB1/04	**Course name:** Seminar from Nuclear Physics

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: 1.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
To bring the topical problems, methodics and tools of high energy physics to the students.

Brief outline of the course:
Department seminar - selected topical problems of the nuclear and subnuclear physics.

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 13

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

Provides: doc. RNDr. Jozef Urbán, CSc.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SEC1/04	**Course name:** Seminar from Nuclear Physics

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: 2.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
To bring the topical problems, methodics and tools of high energy physics to the students.

Brief outline of the course:
Department seminar - selected topical problems of the nuclear and subnuclear physics.

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 12

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

Provides: doc. RNDr. Jozef Urbán, CSc.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SED1/04	**Course name:** Seminar from Nuclear Physics

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: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
To bring the topical problems, methodics and tools of high energy physics to the students.

Brief outline of the course:
Department seminar - selected topical problems of the nuclear and subnuclear physics.

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 12

A	B	C	D	E	FX
83.33	8.33	8.33	0.0	0.0	0.0

Provides: doc. RNDr. Jozef Urbán, CSc.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SPJ1/99	**Course name:** Special Practice from Nuclear Physics

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:
written tests, measurements of experimental tasks, written reports of tasks

Learning outcomes:
Practice in nuclear physics – quantitative and qualitative analysis, selected detector methods and tasks.

Brief outline of the course:
Introduction to practice. Quantitative and qualitative analysis. Gamma source identification using ethalon. Activity determination of gamma source.Identification of unknown beta source from their maximal energy. Beta - spectroscope. Determination of short lived radioisotop halftimes.Semiconductor detectors. Fine structure of the alpha spectrum of Am-241.Franck-Hertz experiment with Hg tube. Virtual laboratory of nuclear physics.

Recommended literature:
1. J.Vrláková, S.Vokál: Základné fyzikálne praktikum, skriptá PF UPJŠ, Košice, 2012, dostupné na : http://www.upjs.sk/public/media/5596/Zakladne-fyzikalne-praktikum-III.pdf
2. W.R.Leo: Techniques for Nuclear and Particles Physics Experiments, Springer-Verlag,1994

Course language:
slovak

Course assessment
Total number of assessed students: 11

A	B	C	D	E	FX
81.82	18.18	0.0	0.0	0.0	0.0

Provides: RNDr. Janka Vrláková, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SPJFa/14	**Course name:** Semestral project 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:
Successful solution of tasks given by the supervisor and presentation of the achieved results orally or in written form.

Learning outcomes:
To learn the basic problems and methods of data processing and data analysis in the nuclear and subnuclear physics.

Brief outline of the course:
To solve selected problems from nuclear and subnuclear physics.

Recommended literature:
As recommended by the supervisor

Course language:
slovak and english

Course assessment
Total number of assessed students: 7

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

Provides:

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SPJFb/14	**Course name:** Semestral project 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:
Successful solution of tasks given by the supervisor and presentation of the achieved results orally or in written form.

Learning outcomes:
To learn the basic problems and methods of data processing and data analysis in the nuclear and subnuclear physics.

Brief outline of the course:
To solve selected problems from nuclear and subnuclear physics.

Recommended literature:
As recommended by the supervisor.

Course language:
slovak and english

Course assessment
Total number of assessed students: 7

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

Provides:

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SPJFc/14	**Course name:** Semestral project 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:
Successful solution of tasks given by the supervisor and presentation of the achieved results orally or in written form.

Learning outcomes:
To learn the basic problems and methods of data processing and data analysis in the nuclear and subnuclear physics.

Brief outline of the course:
To solve selected problems from nuclear and subnuclear physics.

Recommended literature:
As recommended by the supervisor.

Course language:
slovak and english

Course assessment
Total number of assessed students: 8

A	B	C	D	E	FX
62.5	25.0	0.0	0.0	12.5	0.0

Provides:

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ SVKJ/99	**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: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
Contribution to Student Scientific Conference

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Course assessment
Total number of assessed students: 22

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

Provides:

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/TRS/03	**Course name:** Special 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: 1.

Course level: I., II.

Prerequisities: ÚFV/TEP1/03

Conditions for course completion:
Final examination

Learning outcomes:
To acquaint students with principles of a special theory of relativity.

Brief outline of the course:
Galilean transformation and Galilean principle of relativity. Ether's hypothesis. Michelson experiment. Einstein's principles of the special theory of relativity. Lorentz transformation and its physical consequences. Interval and light cone. Proper time. Minkowski's space-time. Mathematical apparatus of special relativity. Relativistic electrodynamics. Relativistic mechanics.

Recommended literature:
1. Greiner W.: Classical Mechanics-Point Particles and Relativity, Springer-Verlag, New York, 2004.
2. Goldstein H., Poole Ch., Safko J.: Classical Mechanics, Addison Wesley, San Francisco, 2002.
3. Landau L.D., Lifšic E.M.: The Classical Theory of Fields, Pergamon Press, Oxford, 1975.

Course language:
1. Slovak,
2. English

Course assessment
Total number of assessed students: 164

A	B	C	D	E	FX
51.83	23.17	13.41	6.71	4.88	0.0

Provides: prof. RNDr. Andrej Bobák, DrSc.

Date of last modification: 21.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚTVŠ/ TVa/11	**Course name:** Sports Activities I.

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

Number of 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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚTVŠ/ TVb/11	**Course name:** Sports Activities II.

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

Number of 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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚTVŠ/ TVc/11	**Course name:** Sports Activities III.

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

Number of 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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚTVŠ/ TVd/11	**Course name:** Sports Activities IV.

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

Number of 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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ UKF/12	**Course name:** Introductory Medical Physics

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

Number of credits: 4

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
Provide an overview of physical principles and methods of application of ionizing radiation in medicine - in the radiological diagnosis, nuclear medicine, radiation and principles of radiation protection against the effects of ionizing radiation.

Brief outline of the course:
The basic concepts of medical physics. Medical physics, principles, values and units used in medical physics. Sources of ionizing radiation used in medicine - radionuclides and generators. Photon interactions. Electron interactions. Interaction of protons, neutrons and heavy ions. X - rays and electron radiations of generators, accelerators. Overview of irradiation techniques (CRT, IMRT, stereotactic therapy). Physical principles of brachytherapy. Review of methods of clinical dosimetry, the principles of the detection and measurement of ionizing radiation. Therapeutic techniques and applications of planning systems for radiation oncology. Radiobiology models for prediction of the effects of ionizing radiation. Principles of radiation protection and current legislation.

Recommended literature:
1. Podorsak E.B..et al. : Radiation Oncology Physics , IAEA
2. Kahn F.M.: The Physics of radiation Therapy ,Lippincott Williams and Wilkins

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: doc. RNDr. Pavel Matula, CSc.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ UMJF/06

Course name: Introduction to Experimental Methods in Nuclear 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: 4

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities:

Conditions for course completion:
written tests and thesis
exam

Learning outcomes:
Students will acquire basic knowlwdges on interactions of ionizing radiation in the matter and principles of acceleration and detection of elementary particles.

Brief outline of the course:
Accelerators of charged particles - linear and circular,colliding beams. Particle passage through the matter. Energy loss of charged particles. Multiple scattering. Interactions of electrons and gamma radiation with matter. Transition radiation. Particle detection. Gaseous ionization detectors. Scintillation detectors. Cherenkov detectors. Semiconductor detectors. Spectrometry of charged particles. Tracking detectors.

Recommended literature:
1.- Kleinknecht K., Detectors for particle radiation, Cambridge, 1986.
2.- Fernow R.: Introduction to experimental particle physics, Cambridge, 1986.
3.- Leo W.R., Techniques for Nuclear and Particle Physics Experiments, Springer Verlag, New York Berlin Heidelberg, 1994.
4.- Grupen C.: Particle detectors, Cambridge, 1996.
5.- Slugeň V. a iní, Jadrovo-energetické zariadenia, STU Bratislava, 2003.

Course language:
slovak and english

Course assessment
Total number of assessed students: 15

A	B	C	D	E	FX
73.33	20.0	0.0	6.67	0.0	0.0

Provides: prof. RNDr. Stanislav Vokál, DrSc., RNDr. Adela Kravčáková, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

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. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ VOM/09	**Course name:** The Universe at Microscopic Level

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:

Learning outcomes:
To provide the students with the recent knowledge of the structure of the Universe at the elementary particle level.

Brief outline of the course:
The lectures provide an insight into the microstructure of the Universe - starting with early cosmic phases like quark-gluon plasma, baryogenesis and first nuclei creation and continue with the structure of nowadays Universe: main sequence stars, white dwarfs, neutron stars, black holes, interstellar and inter galactic space, dark matter and dark energy and cosmic rays.

Recommended literature:
1. D. Griffiths: Introduction to Elementary Particles, Wiley-VCH, Weinheim, 2004
2. D. Perkins: Particle Astrophysics, Oxford University Press, Oxford, 2003
3. D. Prialnik: An Introduction to the Theory of Stellar Structure and Evolution, Cambridge University Press, Cambridge, 2000

Course language:

Course assessment
Total number of assessed students: 16

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

Provides: doc. RNDr. Marek Bombara, PhD.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZDC/14	**Course name:** Introduction to particle detection by calorimetric methods

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: 2.

Course level: II.

Prerequisities:

Conditions for course completion:

Learning outcomes:
Special lectures as intoduction to partcle calorimetry.

Brief outline of the course:
PASSAGE OF PARTICLES THROUGH MATTER
Electronic energy loss by heavy particles, Moments and cross sections, Maximum energy transfer in a single collision
Stopping power at intermediate energies, Mean excitation energy, Density effect, Energy loss at low energies
Energetic knock-on electrons (δ rays) , Restricted energy loss rates for relativistic ionizing particles
Fluctuations in energy loss, Energy loss in mixtures and compounds, Ionization yields
Multiple scattering through small angles,
Photon and electron interactions in matter
Collision energy losses by e±, Radiation length, Bremsstrahlung energy loss by e±
Critical energy, Energy loss by photons, Bremsstrahlung and pair production at very high energies
Photonuclear and electronuclear interactions at still higher energies , Muon energy loss at high energy
Cherenkov and transition radiation
Optical Cherenkov radiation
Coherent Cherenkov radiation
CALORIMETERS
Principles of Calorimetry
Electromagnetic and Hadronic Showers
Shower Profiles and Containment
Electromagnetic calorimeters
Hadronic calorimeters
Free electron drift velocities in liquid ionization chamber
Types of Calorimeters:
Compensating and non-compensating
Total Absorption, Sampling, homogeneous
Scintillation, Ionization, Cherenkov

Signal Detection
Shower shapes in hadron calorimeters
Fluctuations in hadronic energy measurements
Position resolution in the calorimeters
Shower maximum detectors
Signal read-out, processing, calibration of readout electronics. Physics calibration of electromagnetic and hadron calorimeters, jet reconstruction, determination of missing energy and that of the jet energy scale.(Getting from calorimetry to physics results)
Energy and position resolution in calorimetry.

Recommended literature:

http://pdg.lbl.gov/2013/reviews/contents_sports.html
http://indico.cern.ch/getFile.py/access?contribId=24&resId=0&materialId=slides&confId=44587
http://www.slidefinder.net/c/
calorimetry_energy_measurements_prof_robin/252b_lecture8/27257380
http://www-ppd.fnal.gov/EPPOffice-w/Academic_Lectures/DGreen.pd
phttp://www-group.slac.stanford.edu/sluo/lectures/detector_lecture_files/detectorlectures_13.pd
http://indico.cern.ch/getFile.py/access?contribId=24&resId=0&materialId=slides&confId=44587
http://www.kip.uni-heidelberg.de/atlas/seminars/WS2009_JC/compensation1

Course language:

English

Course assessment

Total number of assessed students: 4

A	B	C	D	E	FX
75.0	0.0	0.0	0.0	25.0	0.0

Provides: doc. RNDr. Jozef Urbán, CSc., doc. RNDr. Dušan Bruncko, CSc., RNDr. Pavol Stríženec, CSc.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: ÚFV/ ZMSE/07	**Course name:** Introduction to Simulations and Modeling of Experiments

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:

Learning outcomes:
Introduce the basics of Monte-Carlo methods and the applications in the simulation of high energy physics processes.

Brief outline of the course:
Mathematical foundations of Monte-Carlo methods. Buffon`s needle and basic MC methods. Comparisons of Monte-Carlo integrations with numerical quadrature. Random number generators (random numbers, random numbers generation, tests of random number generators). Monte-Carlo simulations of high energy physics processes.

Recommended literature:
James F.: Monte-Carlo theory and practice, Rep. Prog. Phys. 43, 1980, s. 1145-1189; Cern preprint DD/80/6, February 1980.
http://placzek.home.cern.ch/placzek/lectures,
http://en.wikipedia.org/wiki/Monte_Carlo_method

Course language:

Course assessment
Total number of assessed students: 9

A	B	C	D	E	FX
66.67	11.11	0.0	0.0	22.22	0.0

Provides: doc. RNDr. Jozef Urbán, CSc.

Date of last modification: 20.02.2017

Approved: Guaranteeprof. RNDr. Stanislav Vokál, DrSc.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ ÚTVŠ/CM/13	**Course name:** Seaside Aerobic Exercise
Course type, scope and the method: **Course type:** Practice **Recommended course-load (hours):** **Per week: 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. Stanislav Vokál, DrSc.