CONTENT

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KF/ 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 ECTS 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:

Notes:

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: 17.09.2020

Approved:

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 ECTS 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:
1. -2. Properties of radioactive radiation. Artificial radioactivity. Interaction of radiation with matter. Production of radionuclides. Methods of using nuclear radiation and radioactivity.
3.-4. Influence of ionizing radiation on humans. Effects of ionizing radiation on the cell. Factors influencing the radiobiological effect of radiation. Irradiation disease.
5.-6. Dosimetry and radiation protection. System of dosimetric quantities. Methods of measuring dosimetric quantities. Radiation protection, limits and standards.
7. Activation analysis, principles of the method. Absolute and relative method. Determining the quantity of an element. Preparation of samples and standards. Interfering processes. Applications.
8. Radioactive indicators, basic characteristics. principles of the method. Selection and properties of isotope indicators. Requirements for radioactive indicators. Examples of applications. Overview of the most important radionuclides.
9.-10. Radioactive dating methods. Radiocarbon and tritium dating. Applications. Other methods.
11.-12. Radiobiological effects of ionizing radiation, new trends, hadron therapy.

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
3. Ahmed S.N., Physics & Engineering of Radiation Detection, Elsevier, 2015
4. Dosanjh M.: From Particle Physics to Medical Applications, IOP Publishing, 2017
5. Powsner R.A.: Essential Nuclear Medicine Physics, Blackwell Publishing, 2006

Course language:
slovak and english

Notes:

Course assessment
Total number of assessed students: 11

A	B	C	D	E	FX
63.64	27.27	9.09	0.0	0.0	0.0

Provides: doc. RNDr. Janka Vrláková, PhD.

Date of last modification: 06.08.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KF/ 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 ECTS 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:

Notes:

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: PhDr. Dušan Hruška, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KPPaPZ/KK/07	**Course name:** Communication and Cooperation
Course type, scope and the method: **Course type:** Practice **Recommended course-load (hours):** **Per week:** 2 **Per study period:** 28 **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course: 3.	
Course level: II.	
Prerequisities:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment

Total number of assessed students: 281

abs	n	z
98.22	1.78	0.0

Provides: Mgr. Ondrej Kalina, PhD., Mgr. Lucia Barbierik, PhD.
Date of last modification: 24.06.2021
Approved:

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 ECTS 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:	
Notes:	

Course assessment
Total number of assessed students: 35

A	B	C	D	E	FX
97.14	2.86	0.0	0.0	0.0	0.0

Provides: RNDr. Pavol Bobik, PhD.

Date of last modification: 27.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 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:

Notes:

Course assessment
Total number of assessed students: 65

A	B	C	D	E	FX
70.77	18.46	6.15	1.54	3.08	0.0

Provides:

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: 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 ECTS 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:

Notes:

Course assessment
Total number of assessed students: 27

A	B	C	D	E	FX
40.74	33.33	11.11	7.41	7.41	0.0

Provides: doc. RNDr. Marek Bombara, PhD.

Date of last modification: 27.05.2015

Approved:

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 ECTS credits: 8

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities:

Conditions for course completion:
Active participation in lectures and seminars
2. Elaboration of a written report
3. Passing the oral exam
Detailed conditions are updated annually on the electronic notice board of the subject in AiS2 or within the repository for digital support materials (LMS UPJŠ, MS Teams UPJŠ, etc.)
The teacher excuses the justified absence of the student (incapacity for work, family reasons, etc.) for a maximum of two lectures during the semester without the need for substitute performance.
In the case of a longer-term justified absence (for example due to incapacity for work), the student will be assigned an alternative form of mastering the missed substance.

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:
1. Principles and construction of particle detectors: quantities characterizing detectors.
2. Interaction of particles with matter.
3. Gaseous detectors: Proportional chambers, MWPC. Drift chambers, TPC.
4. Special types of gas detectors, MSGC.
5. Silicon detectors (pixels/strips).
6. Scintilators and photodetectors.
7. Methods of physical quantities measurement: Vertex detectors. Track detectors (measurement of coordinates, paths, angles, momenta). Charged particle identification (ionisation losses, time of flight ...).
8. Calorimetry, electromagnetic and hadron calorimeters.
9. Large detector systems, fixed target and collider experiments.
10. - 12. Basis of electronics used in subnuclear physics (fundamental concepts, principles, requirements, specialness).

Recommended literature:
Fernow R.: Introduction to experimental particle physics, Cambridge, 1986.
Kleinknecht K.: Detectors for particle radiation, Cambridge, 1986.

Bartke J.: Introduction to Relativistic Heavy Ion Physics, World Scientific Publishing, Singapore, 2009.
Grupen C.: Particle detectors, Cambridge, 2011.
Ahmed S. N.: Physics & Engineering of Radiation Detection, Elsevier, Amsterdam, 2015.

Course language:
slovak and english

Notes:

Course assessment
Total number of assessed students: 24

A	B	C	D	E	FX
62.5	29.17	4.17	4.17	0.0	0.0

Provides: doc. RNDr. Adela Kravčáková, PhD., doc. RNDr. Marek Bombara, PhD., RNDr. Ivan Králik, CSc.

Date of last modification: 31.08.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: KF/ 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 ECTS credits: 4

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:

Learning outcomes:

Brief outline of the course:

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 742

A	B	C	D	E	FX
60.78	13.88	12.67	8.63	3.37	0.67

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

Date of last modification: 25.03.2020

Approved:

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 ECTS credits: 2

Recommended semester/trimester of the course: 2.

Course level: I., II.

Prerequisities:

Conditions for course completion:
term project
examination

Learning outcomes:
Basic facts in the history of physics.

Brief outline of the course:
1.-2. Evolution of knowledge before Galileo.
3.-4. Evolution of physics within the mechanical picture of the world.
5.-6. Evolution and limits of classical physics, phase of breakthrough in physics.
7.-8. Origin and evolution of the theory of relativity. Quantum physics and prospects of further evolution of physics and their application.
9.-10. Atomic and nuclear physics.
11.-12. Subnuclear physics. 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:

slovak and english

Notes:

Course assessment
Total number of assessed students: 35

A	B	C	D	E	FX
82.86	8.57	8.57	0.0	0.0	0.0

Provides: prof. RNDr. Stanislav Vokál, DrSc., doc. RNDr. Janka Vrláková, PhD.

Date of last modification: 06.08.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: KF/ 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 ECTS 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:

Notes:

Course assessment
Total number of assessed students: 10

A	B	C	D	E	FX
90.0	10.0	0.0	0.0	0.0	0.0

Provides: Doc. PhDr. Peter Nezník, CSc.

Date of last modification: 12.02.2021

Approved:

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 ECTS 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

Notes:

Course assessment
Total number of assessed students: 18

A	B	C	D	E	FX
77.78	16.67	0.0	5.56	0.0	0.0

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

Date of last modification: 03.05.2015
Approved:

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 ECTS 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:

Notes:

Course assessment
Total number of assessed students: 10

A	B	C	D	E	FX
60.0	10.0	10.0	0.0	20.0	0.0

Provides: RNDr. Martin Val'a, PhD.

Date of last modification: 30.03.2020

Approved:

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 ECTS 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

Notes:

Course assessment
Total number of assessed students: 5

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

Provides: RNDr. Martin Vaľa, PhD.

Date of last modification: 30.03.2020

Approved:

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 ECTS 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

Notes:

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. Dušan Bruncko, CSc., RNDr. Pavol Stríženec, CSc.

Date of last modification: 03.05.2015

Approved:

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 ECTS 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:

Notes:

Course assessment
Total number of assessed students: 11

A	B	C	D	E	FX
90.91	9.09	0.0	0.0	0.0	0.0

Provides: doc. RNDr. Pavel Matula, CSc.

Date of last modification: 29.05.2015

Approved:

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 ECTS 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:

Notes:

Course assessment
Total number of assessed students: 5

A	B	C	D	E	FX
80.0	20.0	0.0	0.0	0.0	0.0

Provides: doc. RNDr. Pavel Matula, CSc.

Date of last modification: 31.03.2020

Approved:

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 ECTS credits: 4	
Recommended semester/trimester of the course:	
Course level: II.	
Prerequisities: ÚFV/FEC1/04,ÚFV/EJF1a/04,ÚFV/FJA1/14,ÚFV/KTP1a/03,ÚFV/KTP1b/03	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	

Course assessment

Total number of assessed students: 10

A	B	C	D	E	FX
70.0	10.0	10.0	10.0	0.0	0.0

Provides:
Date of last modification: 18.05.2016
Approved:

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 ECTS 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: 1.-2. Introduction to nuclear reactions. Conservation laws, kinematics, cross section, scattering theory. 3.-5. 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. 6.-8.Neutron physics. Neutron induced reactions. 9. Heavy ion reactions. 10.Gamma reactions. 11. Nuclear synthesis. Fusion in the Sun and Stars, carbon cycle, proton cycle. 12. Application - nuclear medicine physics.	
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 4. Cahn R., Goldhaber G., The experimental Foundations of Particle Physics, Cambridge Univ. Press, 2011 5. Iliadis Ch., Nuclear Physics of Stars, Wiley -VCH Verlag, 2015 6. Heyde K., Basic Ideas and Concepts in Nuclear Physics, IoP Publ., 2004	
Course language: slovak and english	
Notes:	

Course assessment
Total number of assessed students: 16

A	B	C	D	E	FX
68.75	25.0	0.0	6.25	0.0	0.0

Provides: doc. RNDr. Janka Vrláková, PhD.

Date of last modification: 09.08.2021

Approved:

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 ECTS credits: 4

Recommended semester/trimester of the course: 1.

Course level: II.

Prerequisities:

Conditions for course completion:
Active participation in lectures.
Passing the oral exam.
Detailed conditions are updated annually on the electronic notice board of the subject in AiS2 or within the repository for digital support materials (LMS UPJŠ, MS Teams UPJŠ, etc.)
The teacher excuses the justified absence of the student (incapacity for work, family reasons, etc.) for a maximum of two lectures during the semester without the need for substitute performance.
In the case of a longer-term justified absence (for example due to incapacity for work), the student will be assigned an alternative form of mastering the missed substance.

Learning outcomes:
Extension of basic knowledge of nuclear physics on a better theoretical basis:
Theory of scattering.
Properties of nucleus. Nuclear masses, binding energy. Nuclear radius, density distribution of nuclear matter.
Nuclear momentum and parity. Spin and magnetic momentum of nuclei. Quadrupole electric momentum.
Theory of deuteron. Nuclear spin and isospin.
Nuclear forces. Models of atomic nucleus.
Alpha, beta, gamma radioactive decay.

Brief outline of the course:
1. Introduction. Theoretical and experimental methods.
2. Sources of particles, accelerators and accumulation rings, colliding beams,
3. Particle scattering problem.
4. Properties of stable atomic nuclei: basic elements of atom, antiparticles.
5. Nuclear composition, isotopes, isobars, nuclides, mass and binding energy, spin and parity.
6. Nuclear moments and nucleus shape: dipole moment, magnetic moment, quadrupole moment,
7. Magnetic moments, measurement of nuclear moments.
8. Shape, dimensions and structure of atomic nuclei.
9. Models of atomic nuclei and nuclear forces: one-particle, droplet, layer and generalized model.
10. Properties of nuclear forces, meson and field theory of nuclear forces.

11. Decay of unstable nuclei, radioactivity and its laws.
12. Decays of α, β, γ and their applications.

Recommended literature:

Preston M.A. , Physics of the Nucleus, Addison-Wesley Publishing Company, 1962.
Bertulani C., Danielewicz P., Introduction to Nuclear Reactions, IoP, 2004.
Suhonen J., From Nucleons to Nucleus, Springer, 2007.

Course language:
slovak and english

Notes:

Course assessment
Total number of assessed students: 47

A	B	C	D	E	FX
61.7	14.89	10.64	8.51	4.26	0.0

Provides: doc. RNDr. Adela Kravčáková, PhD.

Date of last modification: 16.07.2021

Approved:

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 ECTS 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:

Notes:

Course assessment
Total number of assessed students: 12

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

Provides: RNDr. Martin Vaľa, PhD.

Date of last modification: 03.05.2015

Approved:

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 ECTS 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:

Notes:

Course assessment
Total number of assessed students: 12

A	B	C	D	E	FX
91.67	0.0	0.0	0.0	8.33	0.0

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

Date of last modification: 30.03.2020

Approved:

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 ECTS credits: 4

Recommended semester/trimester of the course:

Course level: II.

Prerequisities:

Conditions for course completion:
Conditions for the continuous assessment during the semester:
Active work (maximum 5 points, 2 absences are allowed).
Preparation, presentation and discussion on a selected topic - max. 15 points.
Written examination (maximum 30 points).
Conditions for admission to the exam: min. 25 points.
Conditions for the final assessment:
Exam: written form (max. 50 points, min. 25 points)
Conditions for successful completion of the course: participation in lessons, fulfillment of assignments and at least 66 points from the overall evaluation.
Detailed information in the electronic bulletin board of the course in AIS2. The teaching of the subject will be realized by a combined method.

Learning outcomes:
The student will understand the basic concepts and theories of health psychology, can explain salutogenic factors as well as the consequences of risk behavior related to health. He is able to apply the knowledge especially in the field of prevention of burnout syndrome and support of mental health in the work of a teacher.

Brief outline of the course:
1 Introduction to health psychology
2 Psychoimmunology
3 Personality factors and health
4 Social support as a protective factor in relation to health
5 Subjective well-being
6 Stress and stressful situations and ways to manage them
7 Burnout syndrome
8 Health-promoting behavior, mental hygiene
9 Health risk behavior
10 School as an important factor of health

Recommended literature:
Křivohlavý, J.: Psychologie zdraví. Portál, Praha 2001.

Křivohlavý, J.: Psychologie nemoci. Grada, Praha, 2002.
Křivohlavý, J.: Psychologie moudrosti a dobrého života. Grada, Praha, 2009.
Kebza, V.: Psychosociální determinanty zdraví. Academia, Praha 2005.
Kahneman, D., Diener, E., Schwarz, N.(Eds), Well-Being. The Foundations of Hedonic Psychology. New York, Russell Sage Foundation, 2003.
Kaplan, R. M.: Zdravie a správanie človeka. SPN, Bratislava 1996.
Sarafino, E. P.: Health Psychology. Biopsychosocial interactions. John Wiley and sons 1994.
Baštecký, J., Šavlík, J., Šimek, J. 1993. Psychosomatická medicína. Praha: Grada
Tress, W., Krusse, J., Ott,J.: Základní psychosomatická péče. Portál, Praha 2008.

Course language:
slovak

Notes:

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 Barbierik, PhD.

Date of last modification: 07.07.2021

Approved:

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 ECTS 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

Notes:

Course assessment
Total number of assessed students: 67

A	B	C	D	E	FX
52.24	20.9	7.46	5.97	11.94	1.49

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

Date of last modification: 09.08.2021

Approved:

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 ECTS 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

Notes:

Course assessment
Total number of assessed students: 59

A	B	C	D	E	FX
54.24	28.81	6.78	5.08	5.08	0.0

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

Date of last modification: 09.08.2021
Approved:

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 ECTS credits: 4

Recommended semester/trimester of the course: 2.

Course level: II.

Prerequisities:

Conditions for course completion:
exam + elaboration of one of the key publications in relativistic heavy ions in a form of a paper draft

Learning outcomes:
Students will obtain basic information about physics of relativistic nuclear collisions and they will have a knowledge of experimental methods used for these collisions as well as experimental signatures of quark-gluon plasma which is created in these collisions. At the end of the course, the student should be able to understand a baseline in publications in corresponding physics area.

Brief outline of the course:
1. week: relativistic kinematics for nuclear collisions, transverse momentum, rapidity and pseudorapidity, measurement results: transverse momentum spectrum and integrated yield
2. week: introduction to quark-gluon plasma physics, Bjorken collision evolution, nuclear matter phase diagram, quark-gluon plasma in early Universe and in neutron stars
3. week: experimental methods of studying the quark-gluon plasma: accelerators with heavy ions (AGS, SPS, RHIC and LHC) and experiments (NA57, STAR and ALICE), overview of experimental signatures of quark-gluon plasma
4. week: particle production in heavy ion collisions, production scaling with number of participants and with number of binary collisions, Glauber model, centrality and multiplicity, Lund model for particle production
5. week: strange particle production in heavy ion collisions and in proton-proton collisions, statistical model, production of deuterons and lighter nuclei
6. week: J/Psi production suppression, production of states with heavy quark as a function of environment temperature
7. week: high momentum transfer processes, jets, nuclear modification factor R_AA, jet quenching in central nucleus-nucleus collisions, dead cone effect
8. week: angular two-particle correlations of particles with high transverse momentum, angular correlations with strange particles, I_AA variable
9. week: collective flow of partons and hadrons in nucleus-nucleus collision, spatial and momentum anisotropy of the collision system, elliptic and triangular flow
10. week: HBT correlations, femtoscopy of like and not like particle pairs, source size and interaction intensity

11. week: hadron resonances and possible changes of their properties in quark-gluon plasma environment, regeneration and rescattering in hadron phase
12. week: baryon production to meson prouction ratio as a signature of the quark-gluon plasma, production of direct photons and dileptons in quark-gluon plasma environment
13. week: indications of quark-gluon plasma production in small collisional systems, e.g. proton-proton or proton-lead collisions
14. week: summary of the experimental signatures of the quark-gluon plasma, outlook to the future - new accelerators and experiments

Recommended literature:
Chenk-Yin Wong: Introduction to High-Energy Heavy Ion Collisions, World Scientific, 1994.
Jerzy Bartke: Introduction to Relativistic Heavy Ion Physics, World Scientific, 2008
Sarkar, Sourav, Satz, Helmut, Sinha, Bikash (Eds.): The Physics of the Quark-Gluon Plasma, Lecture notes in Physics, Springer, 2010
Recent publications

Course language:

Notes:

Course assessment
Total number of assessed students: 26

A	B	C	D	E	FX
57.69	15.38	15.38	0.0	11.54	0.0

Provides: doc. RNDr. Marek Bombara, PhD.

Date of last modification: 09.04.2021

Approved:

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: combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course:

Course level: I., II.

Prerequisities:

Conditions for course completion:
Conditions for course completion:
Attendance

Learning outcomes:
Learning outcomes:
Students will be provided an overview of possibilities how to spend leisure time in seaside conditions actively and their skills in work and communication with clients will be improved. Students will acquire practical experience in organising the cultural and art-oriented events, with the aim to improve the stay and to create positive experiences for visitors.

Brief outline of the course:
Brief outline of the course:
1. Basics of seaside aerobics
2. Morning exercises
3. Pilates and its application in seaside conditions
4. Exercises for the spine
5. Yoga basics
6. Sport as a part of leisure time
7. Application of projects of productive spending of leisure time for different age and social groups (children, young people, elderly)
8. Application of seaside cultural and art-oriented activities in leisure time

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 41

abs	n
12.2	87.8

Provides: Mgr. Agata Horbacz, PhD.
Date of last modification: 15.03.2019
Approved:

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 ECTS credits: 4

Recommended semester/trimester of the course: 3.

Course level: II.

Prerequisities: ÚFV/FEC1/04

Conditions for course completion:
2 x test
Oral 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:
1. Basic building blocks of matter, interactions, symmetries and conservation laws, experiments and units.
2. Scattering processes: elastic and inelastic scattering, Cross section, Fermis „Golden Rule“, Feynman diagrams.
3. Geometric shapes of nuclei: Kinematics of electron scattering, The Rutherford cross section.
4. Mott cross section, Nuclear form factors.
5. Elastic scattering off nucleons: form factor of the nucleons.
6. Quasi-elastic scattering.
7. Deep-inelastic scattering: excited states of nucleons, structure functions, Callan-Gross relation, scale invariance.
8. Parton model, interpretation of structure functions in the Parton model.
9. Quarks, gluons and strong interaction: the quark structure of nucleons, quarks in hadrons, quark-gluon interaction, Scaling violation of the structure functions.
10. Particle production in electron - positron collisions: production of lepton pairs, resonances, non-resonant hadron production, gluon emission.
11. The Mesons: mesonic multiplets, meson masses, decay channels, neutral kaon decay.
12. The Baryons: Production and detection of baryons, baryon multiplets, masses, magnetic moments, decay channels.

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

Notes:

Course assessment
Total number of assessed students: 19

A	B	C	D	E	FX
57.89	21.05	10.53	5.26	5.26	0.0

Provides: doc. RNDr. Adela Kravčáková, PhD.

Date of last modification: 16.07.2021

Approved:

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 ECTS 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

Notes:

Course assessment
Total number of assessed students: 10

A	B	C	D	E	FX
90.0	0.0	0.0	0.0	10.0	0.0

Provides:

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: 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 ECTS 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

Notes:

Course assessment
Total number of assessed students: 10

A	B	C	D	E	FX
80.0	0.0	10.0	0.0	10.0	0.0

Provides:

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: 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 ECTS 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

Notes:

Course assessment
Total number of assessed students: 11

A	B	C	D	E	FX
63.64	18.18	9.09	0.0	9.09	0.0

Provides:

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

Course ID: 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 ECTS 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:

Notes:

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. Janka Vrláková, PhD.

Date of last modification: 03.05.2015

Approved:

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 ECTS 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:

Notes:

Course assessment
Total number of assessed students: 15

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

Provides: doc. RNDr. Janka Vrláková, PhD.

Date of last modification: 31.03.2020

Approved:

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 ECTS 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:

Notes:

Course assessment
Total number of assessed students: 15

A	B	C	D	E	FX
86.67	6.67	6.67	0.0	0.0	0.0

Provides: doc. RNDr. Janka Vrláková, PhD.

Date of last modification: 03.05.2015

Approved:

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 ECTS 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:

Notes:

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: 11.02.2021

Approved:

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 ECTS 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:
1. Introduction to practice.
2. MEDIPIX - study of alpha and beta particles.
3. MEDIPIX - visualization of particle tracks.
4. MEDIPIX - detection of cosmic ray muons.
5. MEDIPIX - radiography.
6. Identification of an unknown gamma emitter, determination of activity.
7. Identification of an unknown beta emitter.
8. Short-lived radioisiotopes.
9.-10. Atom structure, atomic spectra, Frank-Hertz experiment.
11. Study of gamma radiation.
12. Study of beta radiation.
13. Study of alpha spectra.

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
3. V.Vícha: Experimenty s pixelovým detektorem pro výuku jaderné a částicové fyziky, ČVUT, Praha, 2016

Course language:
slovak

Notes:

Course assessment
Total number of assessed students: 14

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

Provides: doc. RNDr. Janka Vrláková, PhD.

Date of last modification: 09.08.2021

Approved:

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 ECTS 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

Notes:

Course assessment
Total number of assessed students: 176

A	B	C	D	E	FX
51.7	21.59	14.2	7.39	5.11	0.0

Provides: RNDr. Tomáš Lučivjanský, PhD.

Date of last modification: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ TVa/11	**Course name:** Sports Activities I.
Course type, scope and the method: **Course type:** Practice **Recommended course-load (hours):** **Per week:** 2 **Per study period:** 28 **Course method:** combined, present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course: 1.	
Course level: I., I.II., II.	
Prerequisities:	
Conditions for course completion: Min. 80% of active participation in classes.	
Learning outcomes: Sports activities in all their forms prepare university students for their professional and personal life. They have a great impact on physical fitness and performance. Specialization in sports activities enables students to strengthen their relationship towards the selected sport in which they also improve.	
Brief outline of the course: Brief outline of the course: Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess. In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness. In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation.	
Recommended literature:	
Course language:	
Notes:	

Course assessment
Total number of assessed students: 12859

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
87.01	0.08	0.0	0.0	0.0	0.04	8.1	4.77

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

Date of last modification: 13.05.2021

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice

Faculty: Faculty of Science

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

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

Number of ECTS credits: 2

Recommended semester/trimester of the course: 2.

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

Prerequisities:

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

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

Brief outline of the course:
Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess.
In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness.
In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation.

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 11675

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
84.52	0.56	0.02	0.0	0.0	0.05	10.63	4.22

Provides: Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Marcel Čurgali, Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Bc. Richard Melichar, Mgr. Petra Tomková, PhD.
Date of last modification: 13.05.2021
Approved:

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: combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 3.

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

Prerequisities:

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

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

Brief outline of the course:
Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess.
In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness.
In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation.

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 7873

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
88.8	0.05	0.01	0.0	0.0	0.03	4.08	7.04

Provides: Mgr. Marcel Čurgali, Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Bc. Richard Melichar, Mgr. Petra Tomková, PhD.
Date of last modification: 13.05.2021
Approved:

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: combined, present

Number of ECTS credits: 2

Recommended semester/trimester of the course: 4.

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

Prerequisities:

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

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

Brief outline of the course:
Within the optional subject, the Institute of Physical Education and Sports of Pavol Jozef Šafárik University provides for students the following sports activities: aerobics, aikido, basketball, badminton, body form, bouldering, floorball, yoga, power yoga, pilates, swimming, body-building, indoor football, S-M systems, step aerobics, table tennis, tennis, volleyball and chess.
In the first two semesters of the first level of education students will master basic characteristics and particularities of individual sports, motor skills, game activities, they will improve level of their physical condition, coordination abilities, physical performance, and motor performance fitness. Last but not least, the important role of sports activities is to eliminate swimming illiteracy and by means of a special program of medical physical education to influence and mitigate unfitness.
In addition to these sports, the Institute offers for those who are interested winter and summer physical education trainings with an attractive program and organises various competitions, either at the premises of the faculty or University or competitions with national or international participation.

Recommended literature:

Course language:

Notes:

Course assessment
Total number of assessed students: 5125

abs	abs-A	abs-B	abs-C	abs-D	abs-E	n	neabs
83.14	0.31	0.04	0.0	0.0	0.0	7.75	8.76

Provides: Mgr. Marcel Čurgali, Mgr. Agata Horbacz, PhD., Mgr. Dávid Kaško, PhD., Mgr. Zuzana Küchelová, PhD., doc. PaedDr. Ivan Uher, PhD., prof. RNDr. Stanislav Vokál, DrSc., Mgr. Patrik Berta, Mgr. Ladislav Kručanica, PhD., Bc. Richard Melichar, Mgr. Petra Tomková, PhD.
Date of last modification: 13.05.2021
Approved:

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 ECTS 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:

Notes:

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: 03.05.2015

Approved:

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ LKSp/13	**Course name:** Summer Course-Rafting of TISA River
Course type, scope and the method: **Course type:** Practice **Recommended course-load (hours):** **Per week: Per study period:** 36s **Course method:** present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: I., II.	
Prerequisities:	
Conditions for course completion: Conditions for course completion: Attendance Final assessment: Raft control on the waterway (attended/not attended)	
Learning outcomes: Learning outcomes: Students have knowledge of rafts (canoe) and their control on waterway.	
Brief outline of the course: Brief outline of the course: 1. Assessment of difficulty of waterways 2. Safety rules for rafting 3. Setting up a crew 4. Practical skills training using an empty canoe 5. Canoe lifting and carrying 6. Putting the canoe in the water without a shore contact 7. Getting in the canoe 8. Exiting the canoe 9. Taking the canoe out of the water 10. Steering a) The pry stroke (on fast waterways) b) The draw stroke 11. Capsizing 12. Commands	
Recommended literature:	
Course language:	
Notes:	

Course assessment Total number of assessed students: 153	
abs	n
45.75	54.25
Provides: Mgr. Dávid Kaško, PhD.	
Date of last modification: 18.03.2019	
Approved:	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚTVŠ/ KP/12	**Course name:** Survival Course
Course type, scope and the method: **Course type:** Practice **Recommended course-load (hours):** **Per week: Per study period:** 36s **Course method:** combined, present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: I., II.	
Prerequisities:	
Conditions for course completion: Conditions for course completion: Attendance Final assessment: continuous fulfilment of all tasks within the course	
Learning outcomes: Learning outcomes: Students will be familiarized with principles of safe stay and movement in extreme natural conditions as they will obtain theoretical knowledge and practical skills to solve the extraordinary and demanding situations connected with survival and minimization of damage to health. The course develops team work and students will learn how to manage and face the situations that require overcoming of obstacles.	
Brief outline of the course: Brief outline of the course: Lectures: 1. Principles of behaviour and safety for movement and stay in unknown mountains 2. Preparation and leadership of tour 3. Objective and subjective danger in mountains 4. Principles of hygiene and prevention of damage to health in extreme conditions Exercises: 1. Movement in terrain, orientation and navigation in terrain (compasses, GPS) 2. Preparation of improvised overnight stay 3. Water treatment and food preparation.	
Recommended literature:	
Course language:	
Notes:	

Course assessment Total number of assessed students: 393	
abs	n
44.53	55.47
Provides: MUDr. Peter Dombrovský, Mgr. Ladislav Kručanica, PhD.	
Date of last modification: 15.03.2019	
Approved:	

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 ECTS 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:

Notes:

Course assessment
Total number of assessed students: 21

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: 03.05.2015

Approved:

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 ECTS 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:

Notes:

Course assessment
Total number of assessed students: 4

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

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

Date of last modification: 03.05.2015

Approved: