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COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PVS/04	Course name: Author's patents, discoveries, software
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Patent filed, invention, software product created.	
Learning outcomes: The PhD student demonstrates the ability to create an innovative product in a given scientific field, or with impact on an interdisciplinary scale or in technical practice.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 44	
abs	n
100.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/COK/22	Course name: Certified training course
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Completion of a certified professional/training course.	
Learning outcomes: The PhD student acquires up-to-date scientific knowledge, develops the capabilities of scientific work and familiarizes himself with the methodologies of making scientific knowledge available. He confronts his own knowledge and skills with other course participants, develops the abilities of peer discussion in the given scientific field.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ CM/22	Course name: Citation in monograph
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 8	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Obtained citation registered in SCI or Scopus.	
Learning outcomes: Obtaining a citation demonstrates broad and very well-founded scientific knowledge in the researched field, based on the ability to formulate research questions, to reflect on a scientific problem in such a way that generates new knowledge. At the same time, a citation in an indexed source demonstrates the competence to communicate new knowledge, which is a significant contribution to scientific knowledge, at the highest expert level.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ CZC/22	Course name: Citation in scientific journal published abroad
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Obtained citation in a foreign scientific journal.	
Learning outcomes: Obtaining a citation demonstrates broad and very well-founded scientific knowledge in the researched field, based on the ability to formulate research questions, to reflect on a scientific problem in such a way that generates new knowledge. At the same time, a citation in an indexed source demonstrates the competence to communicate new knowledge, which is a significant contribution to scientific knowledge, at the highest expert level.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ CDC/22	Course name: Citation in scientific journal published in the country of residence
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Records of citations in the central register of records of publication activity.	
Learning outcomes: A citation in a peer-reviewed scientific journal indicates the quality of a doctoral student's publication activity and the acceptance of his publishing activity in the domestic scientific community.	
Brief outline of the course: Study of literature with a focus on the chosen issue of publication output.	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 12.10.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SCI/22	Course name: Citation registered in Science Citation Index
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 8	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Records of citations in the central register of records of publication activity.	
Learning outcomes: A citation in a peer-reviewed scientific journal indicates the quality of a doctoral student's publication activity and the acceptance of his publishing activity in the scientific community.	
Brief outline of the course: Study of literature with a focus on the chosen issue of publication output.	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 12.10.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/SPAV/22	Course name: Co-investigator of the applied research project
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Co-investigator of the applied research project	
Learning outcomes: The PhD student demonstrates the ability to participate in teamwork, to bring his own contribution to the solution of the project objective of applied research and to take responsibility for assigned tasks. By solving an applied research project, he acquires the ability to implement the project objective according to the established procedure, to follow the project schedule, to coordinate his own activities with colleagues, to participate in the creation of applied research outputs. The PhD student gains valuable experience from the practical course of a grant project with a focus on applied research.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SIG/22	Course name: Co-worker of project supported by internal grant schemes (VVGS)
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Co-worker of project supported by internal grant schemes (VVGS)	
Learning outcomes: The PhD student demonstrates the ability to participate in teamwork, to bring his own contribution to the solution of the project objective within the internal grant system at UPJŠ. By solving the internal VVGS grant, he acquires the ability to implement the project plan according to the established procedure, adhere to the project schedule, coordinate his own activities with colleagues, and participate in the creation of outputs. The PhD student gains valuable experience from the practical course of the grant project.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SMPR/04	Course name: Co-worker of project supported by international grant schemes
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 15	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Membership in the research team of an international project.	
Learning outcomes: Active involvement by solving a specific task within a team of international project solvers. The PhD student demonstrates the ability to work in a team, take responsibility for the assigned task, adhere to the time schedule and fulfill the project outputs. The PhD student gains personal experience from the implementation of an international project, participation in its key stages, creation of measurable outputs, grant funding of science	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 108	
abs	n
100.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ POCF/13	Course name: Computational Physics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 4 Per study period: 56 Course method: distance, present	
Number of ECTS credits: 8	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisites:	
Conditions for course completion: To successfully complete the course, it is necessary for the student to demonstrate a sufficient degree of understanding of the principles of selected advanced computational methods. Lectures are organized in blocks, with a selection of topics reflecting the needs of currently registered students. The course ends with a final oral exam, the completion of which is conditioned by the submission of the project electronically and with the attached computer program. The credit evaluation of the course takes into account the following student workload: direct teaching (2 credits), self-study (2 credits), project work (2 credits), individual consultations (1 credit), and exam (1 credit). The minimum limit for completing the course is to obtain at least 50% of the total score.	
Learning outcomes: To acquaint students with modern methods of computational physics and their application to various physical and non-physical systems. Students have the opportunity to get acquainted with modern Monte Carlo methods and methods of molecular dynamics, developed for demanding simulations of complex systems using parallel programming, as well as their various interdisciplinary applications.	
Brief outline of the course: 1. Modern Monte Carlo methods for application to problematic complex systems with rugged energy surfaces. Multicanonical methods. Parallel tempering method (replica exchange). Calculation of density of states and free energy using the Wang-Landau method. Massively parallelized Wang-Landau replica exchange method for petaflop supercomputers. 2. Molecular Dynamics. Advanced concepts of computer simulation techniques used in statistical physics and their importance for understanding physical systems. Approach of molecular dynamics and its application in problems of statistical physics. Cellular automata for lattice gas. Problems of dynamics. 3. Other models and applications. Sociophysical models based on spin models. Galam's models. Voting model in hierarchical systems. Group decision model. Dynamics of opinion formation. Sznaid's model and its applications. Applications of statistical physics approaches in modeling spatio-temporal data. Time series predictions and digital image processing. Geostatistical applications.	
Recommended literature: Basic literature:	

LANDAU, D.P., BINDER, K.: A Guide to Monte Carlo Simulations in Statistical Physics, Cambridge Univ. Press, 5-th edition, 2021.

BOTTCHER, L., HERRMANN, H.J., Computational Statistical Physics, Cambridge Univ. Press, 2021.

BINDER, K., HEERMANN, D.W., Monte Carlo simulation in statistical physics, Springer-Verlag, Berlin, 2002.

HAILE, J.M., Molecular dynamics simulations, John Wiley & Sons. INC., New York, 1992.

KAMBERAJ, H., Molecular Dynamics Simulations in Statistical Physics: Theory and Applications, Springer Nature Switzerland AG, 2020.

VAN KAMPEN, N.G., Stochastic processes in physics and chemistry, North-Holland, 1990.

CHAKRABARTI, B.K. et al. (Editors), Econophysics and sociophysics: Trends and perspectives, Wiley-VCH, 2006.

GALAM, S., Sociophysics: A Physicist's Modeling of Psycho-political Phenomena, Springer, 2012.

Course language:

Notes:

Course assessment

Total number of assessed students: 11

N	P
0.0	100.0

Provides: prof. RNDr. Milan Žukovič, PhD.

Date of last modification: 16.11.2021

Approved: prof. RNDr. Milan Žukovič, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ODZP/14	Course name: Defence of Doctoral Thesis
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 30	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: The Dissertation thesis is the result of the student's own scientific research. It must not show elements of academic fraud and must meet the criteria of correct research practice defined in the Rector's Decision no. 21/2021, which lays down the rules for assessing plagiarism at Pavel Jozef Šafárik University in Košice and its constituents. Fulfillment of the criteria is verified mainly in the process of supervising and in the process of the thesis defense. Failure to do so is grounds for disciplinary action.	
Learning outcomes: The Dissertation thesis has elements of a scientific work and the student demonstrates extensive mastery of the theory and professional terminology of the field of study, acquisition of knowledge, skills and competences in accordance with the declared profile of the graduate of the field of study, as well as the ability to apply them in an original way in solving selected problems of the field of study. The student demonstrates the ability of independent scientific work in terms of content, formal and ethical aspects. Further details of the Dissertation thesis are determined by Directive no. 1/2011 on the essential prerequisites of final theses and by the Study Rules of Procedure at UPJŠ in Košice for doctoral studies. The doctoral student demonstrated the ability and readiness for independent scientific and creative activity in the field of study of philology in accordance with the expectations of the relevant qualification framework and the profile of the graduate.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 103	
N	P
0.97	99.03

Provides:
Date of last modification: 08.11.2022
Approved: prof. RNDr. Milan Žukovič, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ MDU/04	Course name: Detection Methods and Experiments on Large Colliders
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Conditions for continuous evaluation: 1. Presence at the lectures as specified by the rules of study and indicated by the lecturer. 2. Activity at seminars. Conditions for the final evaluation: Research work on a selected topic. Conditions for the successful course completion: 1. Active presence at lectures. 2. Fulfillment of the conditions of continuous and final evaluation at more than 90% level. Credit evaluation of the course: direct teaching, individual consultations, self-study (1 credit), practical activities – research work (2 credits), evaluation (1 credit).	
Learning outcomes: The student can demonstrate sufficient knowledge about the physics principles and measurement methods in the high energy and particle physics in large experiments with particle accelerators. Acquired knowledge can be actively used during the physics analysis of the real experimental data.	
Brief outline of the course: 1. Passage of radiation through matter. 2. Gaseous detectors: principles of operation, ionization chamber, proportional chamber, spark chamber, streamer chamber, MWPC, drift chamber, TPC. 3. Scintillation detectors: Geiger and Marsden experiments, scintillation detectors, photomultipliers. 4. Calorimeters: calorimetry in the high energy physics, electromagnetic calorimeters, Rossi-Heitler model of the electromagnetic shower, electromagnetic showers, practical realization of electromagnetic calorimeters, energetic resolution of electromagnetic calorimeters. 5. Hadron calorimeters: hadron showers, electromagnetic and hadronic shower components, calorimeter response, compensation, energy resolution. 6. Cherenkov radiation detectors: Cherenkov radiation, differential Ch. detectors, RICH. 7. Transition radiation detectors. 8. Semiconductor detectors: conduction, semiconductors, P-N junction, microstrip detectors, pixel detectors, drift detectors. 9. Time of flight method.	

10. Muon detectors: multiple scattering, Branson plane. 11. Photoemulsion detectors. 12. Experiments at large accelerators. ALICE experiment at LHC at CERN.	
Recommended literature: Dorin N. Poenaru and Walter Greiner: Experimental Techniques in Nuclear Physics, Walter de Gruyter, Berlin-New York, 1997 Kleinknecht K.: Detectors for particle radiation, Cambridge University press, 1986 S. Tavernier, Experimental Techniques in Nuclear and Particle Physics, Springer-Verlag Berlin Heidelberg, 2010	
Course language: slovak or english	
Notes:	
Course assessment Total number of assessed students: 9	
N	P
0.0	100.0
Provides: RNDr. Ivan Králik, CSc.	
Date of last modification: 19.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DPSD/14	Course name: 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: distance, present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Term project, evaluation. Credit evaluation of the course: direct teaching, individual consultations and self-study (1 credit), practical activities – term project (2 credits), evaluation (1 credit). Minimum limit for completion of the course is to obtain at least 51% of the total evaluation.	
Learning outcomes: Lectures on parallel data processing on analysis farms.	
Brief outline of the course: Introduction to batch systems and network storage. Generate multiple events using event generator and run multiple simulations on cluster. Analyze these data to produce physics results. Merge these results when analysis is done.	
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: 9	
N	P
0.0	100.0
Provides: RNDr. Martin Vařa, PhD.	
Date of last modification: 18.11.2021	

Approved: prof. RNDr. Milan Žukovič, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VPZP/22	Course name: Elaboration of reviewer report
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Elaboration of reviewer report	
Learning outcomes: The PhD student demonstrates broad and scientifically based knowledge in the field of study, as well as knowledge of a wide range of methods and approaches. Demonstrates the ability to critically assess a professional problem and its proposed solution, as well as to evaluate it and possibly recommend another solution. He applies knowledge and skills from the field of pedagogical sciences to his own field.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VPKF2/13	Course name: Energetic particles and heliosphere
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Literature search and compilation on one particular subject selected. Concluding work. Credit evaluation of the course: direct teaching, individual consultations and self-study (1 credit), practical activities – concluding work (2 credits), evaluation (1 credit).	
Learning outcomes: To acquaint with the know edge of selected physical processes in the inner and outer heliosphere.	
Brief outline of the course: 1. Introduction. Radial structure of the Sun. 2. Sun atmosphere. Solar flares. Acceleration of particles in eruptions. Solar neutrons and gamma radiation. 3. Solar wind. Interplanetary magnetic field. Corotation interaction areas. 4. Plasma waves in the interplanetary environment. Three-dimensional structure of the heliosphere. 5. Active processes in the Sun. Eruptions and outbursts of coronal matter. Shock waves. 6. Solar radio emissions. Thermal emission. Microwave domain. Radio emissions after eruptions and disturbances in the interplanetary environment. 7. Energy particles in the heliosphere. Populations and resources. Solar energy particles. 8. Transport of particles in the interplanetary field. Theoretical foundations. Spatial diffusion. Diffusion in the space of pitch angles. Diffusion in the space of momentum. 9. Interactions of waves and particles in the heliosphere. Transport equations. 10. Observations of particle propagation in the interplanetary environment. Comparison with experiment. 11. Acceleration of particles on shock waves - theoretical models. 12. Particles on shock waves in the interplanetary environment. 13. Galactic cosmic rays and modulation models.	
Recommended literature: R. Schwenn, E. Marsch (editors), Physics of the Inner Heliosphere II, Particles, Waves and Turbulence, Springer Verlag, 1991 Reames, D. V., Particle acceleration at the Sun and in the heliosphere, Space Science Reviews, vol. 90, pp. 413–491, 1999. doi:10.1023/A:1005105831781. K. Scherer, H. Fichtner, E. Marsch, The Outer Heliosphere: Beyond the Planets, Copernicus Gesellschaft e.V., 2000 Lee, M.A., Mewaldt, R.A., and Giacalone, J., Shock Acceleration of Ions in the Heliosphere, 2012, Space Science Reviews, 173, 247. doi:10.1007/s11214-012-9932-y.	

Marius S. Potgieter, Solar Modulation of Cosmic Rays, Living Reviews in Solar Physics volume 10, Article number: 3 (2013)	
Course language:	
Notes:	
Course assessment	
Total number of assessed students: 3	
N	P
0.0	100.0
Provides: RNDr. Pavol Bobik, PhD.	
Date of last modification: 18.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VPKF1/13	Course name: Energetic particles and magnetospheres
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course: 1.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Literature search and compilation on one particular subject selected. Concluding work. Credit evaluation of the course: direct teaching, individual consultations and self-study (1 credit), practical activities – concluding work (2 credits), evaluation (1 credit).	
Learning outcomes: To acquaint with the know edge of selected physical processes in magnetosphere, especially that of Earth.	
Brief outline of the course: 1. Particle drifts and the first adiabatic invariant. Guiding center approach. Homogeneous magnetic field. 2. Drifts of zero, first and second order. The first adiabatic invariant. Particle drift at the geomagnetic equator. 3. Oscillating motion between mirror points. Particle capture. Equation of parallel motion with respect to a line of force. Energy equation. 4. Drift envelopes. The second adiabatic invariant. 5. Drift of particles in a dipole magnetic field. 6. Monitoring of drift envelopes in a real model of a geomagnetic field. 7. Effects of external forces on particles near the equatorial plane. 8. Periodic drift movement. Drift envelopes in a time-dependent magnetic field. 9. Third adiabatic invariant. Influence of ring current on the path of particles near the equator. 10. Effect of sudden compressions and adiabatic expansions of the magnetosphere. 11. Distribution of trapped particles. Directional flow. 12. Distribution functions of particles in the magnetosphere. 13. Mapping of trapped particles in the inner magnetosphere. Coordinates B-L. 14. Disruption of adiabatic invariants. Diffusion mechanisms. 15. Coordinates and distribution functions used. 16. Diffusion equation. Radial diffusion. Angular diffusion in a symmetric field. Combined radial and angular diffusion.	
Recommended literature: Roederer, J., Dynamics of Geomagnetically Trapped Radiation, Springer, 1970 M.G. Kivelson and C.T. Russell, Introduction to Space Physics, Cambridge University Press, 1995 J. P. Eastwood, H. Hietala, G. Toth, T. D. Phan & M. Fujimoto, What Controls the Structure and Dynamics of Earth's Magnetosphere?, Space Science Reviews volume 188, pages 251–286, 2015	

S. E. Milan, L. B. N. Clausen, J. C. Coxon, J. A. Carter, M.-T. Walach, K. Laundal, N. Østgaard, P. Tenfjord, J. Reistad, K. Snekvik, H. Korth & B. J. Anderson, Overview of Solar Wind–Magnetosphere–Ionosphere–Atmosphere Coupling and the Generation of Magnetospheric Currents, Space Science Reviews volume 206, pages547–573, 2017

Course language:

Notes:

Course assessment

Total number of assessed students: 3

N	P
0.0	100.0

Provides: RNDr. Pavol Bobik, PhD.

Date of last modification: 18.11.2021

Approved: prof. RNDr. Milan Žukovič, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ESH/09	Course name: Extremal States of Matter
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Literature search and compilation on one particular subject selected. Concluding work. The credit evaluation of the course: direct teaching, individual consultations and self-study (1 credit), practical activities – concluding work (2 credits), evaluation (1 credit).	
Learning outcomes: The main goal of lectures is introduction to matter extremal states topic.	
Brief outline of the course: 1. Introduction to basic 2. Plasma 3. Quark-hadrons phase transition 4. Short introduction to modern cosmology 5. Space expansion 6. Simple cosmological models 7. Big hot explosion 8. Phase transitions in early space 9. Elements nucleosynthesis and origin of light elements 10. Compact stars 11. Dark matter, dark energy 12. Inflation space	
Recommended literature: 1. Andrew Liddle, An introduction to modern cosmology, Chichester, UK: Wiley (1998) 129 str. 2. Joseph Silk, The Big Bang 3. Jean Letessier, Johan Rafelski: Hadrons and quark-gluon plasma, Camb. Monogr.Part. Phys. Nucl. Phys. Cosmol. 18: 1-397, 2002. 4. K.Yaki, T. Hatsuda, Y.Miake, Quark-gluon plasma: From big bang to little bang. Camb. Monogr.Part. Phys. Nucl. Phys. Cosmol. 23: 1-446, 2005.	
Course language:	
Notes:	

Course assessment	
Total number of assessed students: 3	
N	P
0.0	100.0
Provides: RNDr. Pavol Bobik, PhD., doc. RNDr. Marek Bombara, PhD.	
Date of last modification: 19.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/DKZU/22	Course name: Home Conference with Foreign Participation
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in a national conference with foreign participation.	
Learning outcomes: By actively participating in a scientific conference, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology in his scientific field. He demonstrates the ability to reflect on a specific scientific problem by using the latest approaches and applying them critically. Demonstrates competence to use existing theories and concepts in an innovative way, as well as generate new original scientific knowledge and communicate research results to a wider audience by adequate means and through Slovak or a foreign language.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 1	
abs	n
100.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ NEM/04	Course name: Implementation of new experimental methodology
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 15	
Recommended semester/trimester of the course: 8.	
Course level: III.	
Prerequisites:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 91	
abs	n
100.0	0.0
Provides:	
Date of last modification:	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZC/22	Course name: International Journal
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 8	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Publication accepted in a foreign journal as an author/co-author.	
Learning outcomes: By publishing in a foreign journal as an author/co-author, the PhD student demonstrates a high level of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZSP1/22	Course name: International Study Stay less than 30 Days
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Completion of a foreign study stay lasting less than 30 days.	
Learning outcomes: By completing a shorter study stay, the PhD student demonstrates the ability to reflect on research problems and work critically with sources at an expert level and in an interdisciplinary context, while being able to generate new knowledge. He is able to actively communicate at an expert level in more than one language. He acts as a responsible independent scientist, works independently and in a group with the aim of pushing the boundaries of knowledge and transferring them to other areas of research, to practice and to the wider public. He can competently argue and explain his ideas.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZSP2/22	Course name: International Study Stay more than 30 Days
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 10	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Completion of a foreign study stay lasting more than 30 days.	
Learning outcomes: By completing the study stay, the PhD student demonstrates the ability to reflect on research problems and work critically with sources at an expert level and in an interdisciplinary context, while being able to generate new knowledge. He is able to actively communicate at an expert level in more than one language. He acts as a responsible independent scientist, works independently and in a group with the aim of pushing the boundaries of knowledge and transferring them to other areas of research, to practice and to the wider public. He can competently argue and explain his ideas	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 1	
abs	n
100.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ MKZ/22	Course name: International abroad conference
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 10	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in an international conference abroad.	
Learning outcomes: By actively participating in an international scientific conference abroad, the PhD student demonstrates a high level of ability to identify, evaluate, and apply correct scientific methods or research methodology in his scientific field. He demonstrates the ability to reflect on a specific scientific problem by using the latest approaches and applying them critically. Demonstrates competence to use existing theories and concepts in an innovative way, as well as generate new original scientific knowledge and communicate research results to a wider audience by adequate means and through a foreign language.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 1	
abs	n
100.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ USM/04	Course name: Introduction to Standard Model
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Knowledge of the subject at a sufficient level, exam. Credit evaluation of the course takes into account the following student workload: direct teaching and individual consultations (2 credits), self-study (2 credits), evaluation (1 credit).	
Learning outcomes: The student learns basic facts about development of the theory of weak interactions.	
Brief outline of the course: 1. Basic properties of the beta decay and the first attempt to explain observed phenomena. A hypothetical particle neutrino. 2. Revolutionary Fermi theory of the beta decay. 3. Parity conservation in weak interaction. The experimental proof of parity violation in the beta decay. 4. A general form of the weak interaction Hamiltonian. 5. Experimental determination of all free parameters of the weak interaction Hamiltonian.	
Recommended literature: 1. J. Hořejší: Introduction to electroweak unification (World Scientific, Singapore 1994); czech version: Elektroslabé sjednocení a stromová unitarita (Karolinum, Praha 1993). 2. P. Renton: Electroweak interactions (Cambridge Univ. Press, Cambridge 1990). 3. Francis Halzen, Alan D. Martin: Quarks and Leptons, John Wiley&Sons; in russian: F.Helzen, A.D.Martin: Kvarki i leptoni, Mir, Moskva, 1987. 4. Cheng T.P., Li L.F.: Gauge theory of elementary particle Physics, Claredon Press, Oxford, 1984.	
Course language: slovak and english	
Notes:	

Course assessment	
Total number of assessed students: 18	
N	P
0.0	100.0
Provides: prof. RNDr. Michal Hnatič, DrSc., RNDr. Ivan Králik, CSc.	
Date of last modification: 18.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DC/22	Course name: Local journal
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 6	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Publication accepted in a national journal as author/co-author.	
Learning outcomes: By publishing in a national journal as an author/co-author, the PhD student demonstrates a high level of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ MONB/22	Course name: Monograph
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Co-author of the monograph.	
Learning outcomes: By publishing a monograph, the PhD student demonstrates a high level of ability to identify, evaluate, and apply correct scientific methods or research methodology. It demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The doctoral student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ MONA/22	Course name: Monograph in a renowned publishing house
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 40	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Co-author of a monograph in a renowned publishing house.	
Learning outcomes: By publishing a monograph in a renowned publishing house, the PhD student demonstrates a high level of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The doctoral student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/DK/04	Course name: National Conference
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in the home conference.	
Learning outcomes: By actively participating in the national scientific conference, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology in his scientific field. He demonstrates the ability to reflect on a specific scientific problem by using the latest approaches and applying them critically. Demonstrates competence in using existing theories and concepts in an innovative way, as well as generating new original scientific knowledge and communicating research results to a wider audience using adequate means and through the Slovak language.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 160	
abs	n
100.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ NRZ/22	Course name: Non-Reviewed International or National Proceedings
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: A publication published in a non-reviewed foreign or national journal as an author/co-author.	
Learning outcomes: By publishing in a non-reviewed foreign or national journal as an author/co-author, the PhD student demonstrates the ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to finalize his own thoughts in a written speech.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ DCK/14	Course name: 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: distance, present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Knowledge of the subject at a sufficient level, evaluation. The credit evaluation of the course takes into account the following student workload: direct teaching (1 credit), self-study (2 credits) and evaluation (1 credit).	
Learning outcomes: Special lectures oriented towards particle calorimetry.	
Brief outline of the course: Interactions of particles with matter: electrons, protons, charged particles, photons, muons. Energy loss, range. Interactions at high energy. 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://indico.cern.ch/getFile.py/access?contribId=24&resId=0&materialId=slides&confId=44587 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.kip.uni-heidelberg.de/atlas/seminars/WS2009_JC/compensation1	
Course language: English	
Notes:	
Course assessment Total number of assessed students: 0	
N	P
0.0	0.0
Provides: RNDr. Pavol Stríženec, CSc.	
Date of last modification: 18.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ UFRJZ/22	Course name: Physics of Relativistic Nuclear Collisions
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Elaboration of a term project on a given topic. 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.) Credit evaluation of the course takes into account the following student workload: direct teaching and individual consultations (1 credit), self-study (1 credit), practical activities - project (2 credits), evaluation (1 credit). The minimum threshold for completing the course is to obtain at least 51% of the total score.	
Learning outcomes: Acquisition of basic knowledges from the heavy ion physics from intermediate to ultra-relativistic energies.	
Brief outline of the course: 1. Introduction 2. Basic overview of the phenomenology of heavy ion collisions 3. Introduction to relativistic kinetic theory 4. Relativistic Boltzmann transport equation 5. Equation of state 6. Relativistic fluid dynamics 7. Simple models 8. Measurable quantities 9. Scaling in hydrodynamic model 10. Direct solution of the kinetic equation 11. Search for quark-gluon plasma 12. Relation to astrophysics	
Recommended literature: 1. J. Bartke, Introduction to Relativistic Heavy Ion Physics, World Scientific Publishing Co. Pte. Ltd., Singapore, 2009. 2. R. Vogt, Ultrarelativistic Heavy-Ion Collisions, Elsevier, 2007. 3. J. Letessier, J. Rafelski: Hadrons and quark-gluon plasma, Camb. Monogr. Part. Phys. Nucl. Phys. Cosmol. 18: 1-397, 2002.	

Course language: slovak and english	
Notes:	
Course assessment Total number of assessed students: 0	
N	P
0.0	0.0
Provides: doc. RNDr. Adela Kravčáková, PhD.	
Date of last modification: 19.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PK/04	Course name: Plasma in Space
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course: 1.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Literature search and compilation on one particular subject selected. Final examination. Credit evaluation of the course: direct teaching and individual consultations (1 credit), self-study (1 credits), practical activities – literature search and compilation (2 credits), evaluation (1 credit).	
Learning outcomes: To acquaint with the specifics of plasma formations in space.	
Brief outline of the course: 1. Differences of matter in cosmic plasma formations from solids, liquids and gases. 2. Distribution function, description of particles in 6D phase space, relation of distribution function and measured flow characteristics. 3. Basic equations for the description of the flow of energetic particles in cosmic plasma. 4. Geomagnetic field. 5. Development of geomagnetic field in the past. IGRF models. 6. Geomagnetic disturbance. Geomagnetic activity indices. The main areas of the Earth's magnetosphere. 7. Particles trapped in magnetic field traps. Description using adiabatic invariants. Disorders of movement and dumping of particles into the upper atmosphere. 8. Atmospheric layers. Influence of cosmic rays on the atmosphere. Radiation doses at different heights and their changes. 9. Propagation of radio waves and the state of the Earth's ionosphere. 10. Plasma of the solar wind. Concentration, flow rate and temperature. The influence of the solar wind on the immediate vicinity of the Earth. 11. Basic data on solar flares. Models of acceleration in eruptions. Classification of eruptions. 12. Plasma and magnetic field in the solar system. Discharges of coronal substance. 13. What is space weather, how is it monitored and what are the prediction methods.	
Recommended literature: 1. Rossi B., Olbert S.: Introduction to the Physics of Space, ruský preklad, Moskva, 1974. 2. George K. Parks, Physics of Space Plasmas, 2004, Westview Press 3. Paul M. Bellan, Fundamentals of Plasma Physics, Cambridge University Press, 2006 4. Current materials published in cosmic physics.	
Course language:	
Notes:	

Course assessment	
Total number of assessed students: 3	
N	P
0.0	100.0
Provides: RNDr. Pavol Bobik, PhD.	
Date of last modification: 19.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ POP/22	Course name: Popularisation of science
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active involvement in the popularization of science.	
Learning outcomes: Demonstrated ability to present science to the lay public, use interactive methods of scientific communication, identify the target group and adapt the communication language to the level of professional knowledge. A PhD student is able to arouse interest and motivate specific target groups in the field of his scientific work, but also in the wider context of science	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 1	
abs	n
100.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VYS/22	Course name: Presentation in Seminar
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Presentation at the seminar	
Learning outcomes: By actively participating in the seminar, the PhD student demonstrates the ability to identify, evaluate, and apply correct scientific methods or research methodology in his field of study. He demonstrates the ability to reflect on a specific scientific problem by using the latest approaches and applying them critically. Demonstrates competence in using existing theories and concepts in an innovative way, as well as generating new original scientific knowledge and communicating research results by adequate means and through Slovak or a foreign language.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ ZRIG/22	Course name: Principal investigator of an internal grant (VVGS)
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 10	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Principal investigator of an internal grant (VVGS)	
Learning outcomes: The PhD student demonstrates the ability to process a successful application for his own research problem within the internal grant system at UPJŠ. Acquires skills with the design of research stages, their time schedule, measurable outputs and adequate distribution of funds. The very solution of the internal VVGS grant acquires the ability to implement the project intention according to the established procedure, to be responsible for achieving the set outputs. As a responsible researcher, the PhD student acquires competencies in project management, its administration, and presentation of results.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ Q1SA/22	Course name: Q1 journal as co-author
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 30	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Publication accepted in a journal of category Q1 as co-author.	
Learning outcomes: By publishing in a journal of category Q1 as a co-author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ Q11A/22	Course name: Q1 journal as first or corresponding author
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 40	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Publication accepted in a journal of category Q1 as first or corresponding author	
Learning outcomes: By publishing in a journal of category Q1 as the first or corresponding author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ Q2SA/22	Course name: Q2 journal as co-author
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Publication accepted in a journal of category Q2 as co-author.	
Learning outcomes: By publishing in a journal of category Q2 as a co-author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 2	
abs	n
100.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ Q21A/22	Course name: Q2 journal as first or corresponding author
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 30	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Publication accepted in a journal of category Q2 as first or corresponding author.	
Learning outcomes: By publishing in a journal of category Q2 as the first or corresponding author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ Q3SA/22	Course name: Q3 journal as co-author
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 15	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Publication accepted in a journal of category Q3 as co-author.	
Learning outcomes: By publishing in a journal of category Q3 as a co-author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ Q31A/22	Course name: Q3 journal as first or corresponding author
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 25	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Publication accepted in a journal of category Q3 as first or corresponding author	
Learning outcomes: By publishing in a journal of category Q3 as the first or corresponding author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ Q4SA/22	Course name: Q4 journal as co-author
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 10	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Publication accepted in a journal of category Q4 as co-author.	
Learning outcomes: By publishing in a journal of category Q4 as a co-author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ Q41A/22	Course name: Q4 journal as first or corresponding author
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Publication accepted in a journal of category Q4 as first or corresponding author.	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ KCHD/04	Course name: Quantum Chromodynamics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course: 1.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Knowledge of the subject at a sufficient level, exam. The credit evaluation of the course takes into account the following student workload: direct teaching (2 credits), self-study (2 credits) and evaluation (1 credit).	
Learning outcomes: Lectures are oriented on explanation of the strong interaction on the base of first principles, their description and analysis of both elastic and deep-inelastic scattering of hadrons and leptons. Determination of the color is introduced, which is basic quantum number for strongly interacting particles and fundamental physical principle on which quantum chromodynamics (QCD) is constructed. Basic features of this theory are explained and it is demonstrated its application for calculation cross sections of typical interacting processes in presence of mesons and baryons.	
Brief outline of the course: 1. The concept of color as the basic quantum number of hadrons and the basic principle for formulating a fundamental theory for strongly interacting particles. 2. Color special unitary calibration group SU_c (3). 3. Quarks and gluons as SU_c multiplets (3). 4. Partons, cross sections, formfactors (basic knowledge). 5. Deep-elastic scattering of electrons on a proton. Neutrino scattering on a nucleon. Summation rules. 6. Additive parton model. 7. The concept of structural function. Bjorken scaling. 8. Quantum chromodynamics as a theory of strong interactions and its Lagrangian. 9. Feynman graphs in momentum representation. 10. Binding constant for QCD and asymptotic freedom. 11. Confinement of quarks and gluons. 12. QCD within the standard model.	
Recommended literature: Cheng T.P., Li L.F.: Gauge theory of elementary particle Physics, Claredon, Press, Oxford, 1984. Yndurain F.J.: Quantum chromodynamics. An introduction to the theory of Quarks and gluons, Springer-Verlag, Berlín, 1983;	

Francis Halzen, Alan D. Martin: Quarks and Leptons, John Wiley&Sons, 1984	
Course language: slovak and english	
Notes:	
Course assessment Total number of assessed students: 19	
N	P
0.0	100.0
Provides: prof. RNDr. Michal Hnatič, DrSc.	
Date of last modification: 18.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ RMU/22	Course name: Radiobiological Modeling of the Effect of Ionizing Radiation
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course: 1.	
Course level: III.	
Prerequisites:	
Conditions for course completion: To analyze irradiation plan with the use of radiobiological models NTCP and TCP, exam. Credit evaluation of the course: direct teaching and individual consultations (1credit), self-study (1 credit), practical activities – to analyze IP (2 credits), evaluation (1 credit).	
Learning outcomes: To provide basic knowledge of radiobiological models and their use in radiation planning.	
Brief outline of the course: 1. Radiobiological principles of radiotherapy : cell and cell cycle, cell survival curves, linear quadratic model, biological effective dose, normalised total dose 2. Early and late radiation morbidity, inclusion of repopulation, reparation, reoxygenation and redistribution into LQ model 3. Planning of radiotherapy, Dose volume histogram, DVH reduction techniques, Tolerance doses 4. Historical development of radiobiological models, Lyman-Kucther-Burman model 5. LOGEUD model, Relative seriality model, Critical element model, Critical volume model 6. Modelling of tumor response : Tumor control probability model, Uncomplicated tumor control probability 7. Use of software Biogray for radiobiological modelling 8. Parameters of radiobiological models , fitting of parameters 9. Linear-quadratic-linear model for stereotactic radiotherapy 10. Radiobiological modelling of reirradiation, Impact of radiotherapy prolongation on tumor control 11. Radiobiological basics of proton therapy 12. Optimization of irradiation plans with the use of radiobiological modelling	
Recommended literature: 1. DALE, R., JONES,B. 2007. Radiobiological models in radiation oncology. London: British institute of radiology, 2007. 292 s. ISBN13-978-0-905749-60-0 2. MATULA, P., KONCIK, J. 2018. Key to radiobiological modelling effects in radiation oncology. LAP LAMBERT Academic Publishing 2018. 104s. ISBN13-978-6137342244	

3. FELTL, D., CVEK, J. 2008. Klinická radiobiologie. Praha: Tobiaš, 2008. 105 s. ISBN 9788073111038

Course language:

Notes:

Course assessment

Total number of assessed students: 0

N	P
0.0	0.0

Provides: RNDr. Barbora Hostová, PhD.

Date of last modification: 18.11.2021

Approved: prof. RNDr. Milan Žukovič, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ RZ/22	Course name: Reviewed International or National Proceedings
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: A publication published in a peer-reviewed foreign or national proceedings as an author/co-author.	
Learning outcomes: By publishing in a peer-reviewed foreign or national journal as an author/co-author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to critically evaluate and respond to reviewers' suggestions, to finalize his own ideas.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VPZ/22	Course name: Scientific work after sending to the editorial office
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Scientific work after being sent to the editorial office as an author/co-author.	
Learning outcomes: By sending a manuscript to the editors of a scientific journal as an author/co-author, the PhD student demonstrates a high degree of ability to identify, evaluate, and apply correct scientific methods or research methodology. He demonstrates the ability to reflect on a scientific problem by using the latest approaches and applying them critically. He demonstrates the competence to use existing theories and concepts in an innovative way, as well as to generate new original scientific knowledge, which he can publish according to the highest qualitative and ethical standards of the field. The PhD student demonstrates the ability to formulate his own ideas in a structured form.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 1	
abs	n
100.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VDM/11	Course name: Selected Detection Methods of Nuclear Radiation
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: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Written work and its presentation, preparation and measurement of selected laboratory tasks, exam. Credit evaluation of the subject: direct teaching and consultations (1), self-study (1), practical activities- lab. tasks (2), evaluation (1), total 5 credits. Minimum limit for completion of the course is to obtain at least 51% of the total evaluation.	
Learning outcomes: To extend the theoretical and experimental knowledge about current detection methods and selected detection systems. Gaining knowledge in the preparation of laboratory tasks and experiments in nuclear physics.	
Brief outline of the course: General Characteristics of Detectors. Detectors: ionization, scintillation, semiconductor. Pulse Signals in Nuclear Electronics. Signal Transmission. Electronics for Pulse Signal Processing. Pulse Height Selection and Coincidence. Laboratory practice from selected detection methods.	
Recommended literature: 1. W.R.Leo, Techniques for Nuclear and Particle Physics Experiments, Springer Verlag, 1994 2. J.R.Cooper, K.Randle, R.S. Sokhi: Radioactive Releases in the Environment, Impact and Assessment, J.Wiley & Sons, Ltd., 2003 3. R.L. Murray, Nuclear Energy, An Introduction to the Concepts, Systems and Applications of Nuclear Processes, 6th Edition, Elsevier, 2009 4. S.N.Ahmed, Physics & Engineering of Radiation Detection, Elsevier, 2015	
Course language: Slovak and English	
Notes:	

Course assessment	
Total number of assessed students: 9	
N	P
0.0	100.0
Provides: doc. RNDr. Janka Vrláková, PhD.	
Date of last modification: 22.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VKJSF/04	Course name: Selected Topics from Nuclear and Subnuclear Physics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 4 Per study period: 56 Course method: distance, present	
Number of ECTS credits: 10	
Recommended semester/trimester of the course: 1.	
Course level: III.	
Prerequisites:	
Conditions for course completion: preparation of a paper draft using several selected key publications Credit distribution: lectures + consulting: 37 hours - 2 credits preparation the paper draft + study: 95 hours - 5 credits writing the paper draft: 56 hours - 3 credit	
Learning outcomes: Gain knowledge on the heavy ion experimental programme at CERN SPS accelerator leading to the discovery of the kvark-gluon plasma. Gain knowledge on heavy-ion programme at RHIC collider at BNL and at CERN LHC.	
Brief outline of the course: I. block (1.-6. week): 1. Ultrarelativistic heavy ion collisions. Introduction. Discovery of QGP. 2. SPS accelerator, heavy ion beams and the key experiments at CERN. 3. NA44 experiment. 4. NA45 experiment. 5. NA49 experiment. 6. NA50 experiment. 7. WA97 and NA57 experiments. 8. WA98 experiment. 9. Ingredients of the CERN QGP. 10. Claim of discovery. II. block (7.-12. week): 1. Experiment STAR at RHIC. 2. Discovery of Ridge structure. 3. Indication of Mach cone. 4. Elliptical flow at RHIC. 5. Jet quenching. 6. QGP signatures at CERN LHC. 7. Possible signatures in small systems at ALICE experiment.	

Applied, medical physics:

General part: Rutherford scattering, nuclear phenomenology, nuclear models, nuclear radiation, use of nuclear physics, energy losses in matter, particle detection, accelerators, elementary particle properties, symmetry, discrete transformations, neutral kaons, oscillations and CP violation, Standard model.

Special part: Nuclear reactions, biological effects of radiation, industrial and analytical applications, nuclear medicine.

Recommended literature:

1. Griffiths D.: Introduction to Elementary Particle, WILEY-VCH, 4th Reprint, 2010
2. Bettini A.: Introduction to Elementary Particle Physics, Cambridge Univ. Press, Reprinted 2010
3. Perkins D.H.: Introduction to High Energy Physics, Cambridge University Press, 2000
4. Slugeň V. a iní: Jadrovo-energetické zariadenia, STU Bratislava, 2003
5. Fernow R.: Introduction to Experimental Particle Physics, Cambridge University Press, 1986
6. Das A., Ferbel T.: Introduction to Nuclear and Particle Physics, (2nd Edition), World Scientific Publishing Co. Pte. Ltd., Singapore, 2003
7. Lilley J.S.: Nuclear Physics - Principles and Application, J. Wiley & Sons, Ltd., Chichester, 2001
8. Ashok Das, Thomas Ferbel, Introduction to Nuclear and Particle Physics, (2nd Edition), 2003, World Scientific Publishing Co. Pte. Ltd., Singapore, ISBN 981-238-744-7.
9. John.S. Lilley, Nuclear Physics - Principles and Applications, 2001, John Wiley & Sons, Ltd., Chichester, ISBN-0 471 97935 X, ISBN-0 471 97936 8.

Course language:

slovak and english

Notes:

Course assessment

Total number of assessed students: 26

N	P
0.0	100.0

Provides: doc. RNDr. Marek Bombara, PhD., doc. RNDr. Janka Vrláková, PhD., RNDr. Ivan Králik, CSc.

Date of last modification: 22.11.2021

Approved: prof. RNDr. Milan Žukovič, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VKTF/04	Course name: Selected Topics from Theoretical 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: III.	
Prerequisites:	
Conditions for course completion: Knowledge of the subject at a sufficient level. The credit evaluation of the course takes into account the following student workload: direct teaching and individual consultations (2 credits), self-study (1 credit) and evaluation (1 credit).	
Learning outcomes: The aim is a short renewal of master course and application of quantum field theory in physics of elementary particles and in macroscopic systems with infinite number of degrees of freedom.	
Brief outline of the course: 1. Lectures cover wide sphere of problems of high energy physics and statistical physics. Specific applications are carried out for basic theories of elementary particles – Quantum electrodynamics (QED), Quantum Chromodynamics (QCD), standard model (SM) and for some models of unified theory of elementary particles. 2. Application of quantum field theory to the classical physics is concentrated on explanation of connection between the quantum field and statistical fluctuations of classical fields, generating functional of Green functions of quantum fields and statistical sum, on the Feynman graphs and perturbative technique in statistical physics	
Recommended literature: 1. Bogoljubov N.N., Shirkov D.V.: Vvedenie v teoriju kvantovannich polej, Nauka (1957, 1973, 1984) 2. L.Rajder: Kvantovaja teorija pola, Moskva, Mir (1987) 3. Amit D.J., Field theory , the Renormalization Group, and Critical Phenomena,, McGraw-Hill (1978) 4. Zinn-Justin J.: Quantum Field Theory and Critical Phenomena, Claredon Press, Oxford (1989, 1993) 5. Vasiliev A.N. : Kvantovopolevaja renormgruppa v teorii kritičeskogo povedenia i stochastičeskoj dinamike, Izd. Peterburgskogo instituta jadernoj fiziky, Sankt Peterburg (1998)	
Course language: slovak and english	
Notes:	

Course assessment	
Total number of assessed students: 1	
N	P
0.0	100.0
Provides: prof. RNDr. Michal Hnatič, DrSc.	
Date of last modification: 18.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/SSOL/04	Course name: Self-motivated Study on Scientific Literature
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion:	
Learning outcomes:	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 192	
N	P
0.0	100.0
Provides:	
Date of last modification:	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/SJSF1a/04	Course name: Seminar from Nuclear and Subnuclear Physics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course: 1.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in seminars, presentation at a seminar. The credit evaluation of the course takes into account the following student workload: practical activity - preparation of the contribution and its presentation (3credits).	
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: Slovak and English	
Notes:	
Course assessment Total number of assessed students: 22	
abs	n
100.0	0.0
Provides: doc. RNDr. Janka Vrláková, PhD.	
Date of last modification: 22.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SJSF1b/04	Course name: Seminar from Nuclear and Subnuclear Physics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in seminars, presentation at a seminar. The credit evaluation of the course takes into account the following student workload: practical activity - preparation of the contribution and its presentation in English (3credits).	
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: Slovak and English	
Notes:	
Course assessment Total number of assessed students: 22	
abs	n
100.0	0.0
Provides: doc. RNDr. Janka Vrláková, PhD.	
Date of last modification: 22.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/SJSF2a/04	Course name: Seminar from Nuclear and Subnuclear Physics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course: 3.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in seminars, presentation at a seminar. The credit evaluation of the course takes into account the following student workload: practical activity - preparation of the contribution and its presentation (3credits).	
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: Slovak and English	
Notes:	
Course assessment Total number of assessed students: 19	
abs	n
100.0	0.0
Provides: doc. RNDr. Janka Vrláková, PhD.	
Date of last modification: 22.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SJSF2b/04	Course name: Seminar from Nuclear and Subnuclear Physics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course: 4.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in seminars, presentation at a seminar. The credit evaluation of the course takes into account the following student workload: practical activity - preparation of the contribution and its presentation in English (3credits).	
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: Slovak and English	
Notes:	
Course assessment Total number of assessed students: 19	
abs	n
100.0	0.0
Provides: doc. RNDr. Janka Vrláková, PhD.	
Date of last modification: 22.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/SJSF3a/04	Course name: Seminar from Nuclear and Subnuclear Physics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course: 5.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in seminars, presentation at a seminar. The credit evaluation of the course takes into account the following student workload: practical activity - preparation of the contribution and its presentation (3credits).	
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: Slovak and English	
Notes:	
Course assessment Total number of assessed students: 15	
abs	n
100.0	0.0
Provides: doc. RNDr. Janka Vrláková, PhD.	
Date of last modification: 22.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/SJSF3b/04	Course name: Seminar from Nuclear and Subnuclear Physics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course: 6.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in seminars, presentation at a seminar. The credit evaluation of the course takes into account the following student workload: practical activity - preparation of the contribution and its presentation in English (3credits).	
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: Slovak and English	
Notes:	
Course assessment Total number of assessed students: 14	
abs	n
100.0	0.0
Provides: doc. RNDr. Janka Vrláková, PhD.	
Date of last modification: 22.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/SJSF4a/04	Course name: Seminar from Nuclear and Subnuclear Physics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course: 7.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in seminars, presentation at a seminar. The credit evaluation of the course takes into account the following student workload: practical activity - preparation of the contribution and its presentation (3credits).	
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: Slovak and English	
Notes:	
Course assessment Total number of assessed students: 12	
abs	n
100.0	0.0
Provides: doc. RNDr. Janka Vrláková, PhD.	
Date of last modification: 22.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ SJSF4b/04	Course name: Seminar from Nuclear and Subnuclear Physics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course: 8.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in seminars, presentation at a seminar. The credit evaluation of the course takes into account the following student workload: practical activity - preparation of the contribution and its presentation in English (3credits).	
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: Slovak and English	
Notes:	
Course assessment Total number of assessed students: 12	
abs	n
100.0	0.0
Provides: doc. RNDr. Janka Vrláková, PhD.	
Date of last modification: 22.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/MSF/04	Course name: Simulation of Experiments and Processes in Subatomic Physics
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 5	
Recommended semester/trimester of the course: 1.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Term project, its presentation, evaluation. The credit evaluation of the course takes into account the following student workload: direct teaching (1 credit), self-study (1 credit), practical activities - project, tasks (2 credits) and evaluation (1 credit). The minimum limit for completing the course is to obtain at least 51% of the total score.	
Learning outcomes: To introduce the students into the simulation of experiments and to the available programming tools.	
Brief outline of the course: The role of simulation in physics. Probability theory and mathematical statistics. Frequently used distributions in physics. The Monte Carlo methods. Random number generators and their realisations. Programming tools used in high energy physics experiments simulation (e.g. GEANT, PYTHIA).	
Recommended literature: .Hudson: Lectures on Elementary statistics and probability, CERN 63-29, 1963 D. Hudson: Maximum likelihood and Least square theory, CERN 64-18, 1964 Manuály modelovacích programov A.G. Frodersen, O.Skjeggstad, H.Tofte: Probability and statistics in particle physics, Universitetsforlaget, Bergen-Oslo-Tromso, 1978	
Course language:	
Notes:	
Course assessment Total number of assessed students: 17	
N	P
0.0	100.0
Provides: RNDr. Martin Val'a, PhD.	
Date of last modification: 18.11.2021	

Approved: prof. RNDr. Milan Žukovič, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: Dek. PF UPJŠ/JSD/14	Course name: Spring School for PhD Students
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: Per study period: 4d Course method: distance, present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Active participation in the Spring School of PhD students of UPJŠ.	
Learning outcomes: By actively participating in the Spring School of PhD Students of UPJŠ, the PhD student demonstrates a high level of ability to process the issues of his dissertation for a multidisciplinary audience with an emphasis on clarifying the motivation, scientific problem, processing methodology and own contribution to the solution of the selected topic. The PhD student demonstrates the ability to professionally discuss various research topics, present his own positions and accept a plurality of opinions. Demonstrates the ability to communicate research results to a wider professional audience with adequate means and through the Slovak language.	
Brief outline of the course: 1. Interdisciplinary lectures from the fields of medicine, natural sciences, law, public affairs, humanities. Lecturers - top foreign or national experts from the mentioned fields. 2. Scientific lectures in sections created within related disciplines. Lecturers - top experts from UPJŠ from the mentioned fields. 3. Scientific contributions of PhD students in sections of related fields. 4. Panel discussions on the issue of PhD studies and current trends in the development of scientific disciplines at UPJŠ.	
Recommended literature: Proceedings of the Spring School of Doctoral Students.	
Course language:	
Notes:	
Course assessment Total number of assessed students: 170	
abs	n
100.0	0.0
Provides: doc. RNDr. Marián Kireš, PhD.	

Date of last modification: 08.11.2022
Approved: prof. RNDr. Milan Žukovič, PhD.

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VPSV/22	Course name: Supervision of Student's Scientific Activity
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 8	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Supervision of Student's Scientific Activity	
Learning outcomes: By guiding a student within the SOČ or ŠVOČ, the PhD student demonstrates broad and scientifically based knowledge in the field of study, as well as knowledge of a wide range of methods and approaches. Demonstrates the ability to critically assess a professional problem and its proposed solution, as well as to evaluate it and possibly propose another solution. He applies knowledge and skills from the field of pedagogical sciences to his own field.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ VZP/22	Course name: Supervisor/consultant of final thesis
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 8	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Supervisor of the final thesis.	
Learning outcomes: By supervising the final thesis, the PhD student demonstrates broad and scientifically based knowledge in the field of study, as well as knowledge of a wide range of methods and approaches. Demonstrates the ability to critically assess a professional problem and its proposed solution, as well as to evaluate it and possibly propose another solution. He applies knowledge and skills from the field of pedagogical sciences to his own field.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PPC1/22	Course name: Teaching activities 1h/s
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 2	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Direct teaching activity 1 semester hour	
Learning outcomes: Through pedagogical activity, the PhD student demonstrates the ability to transfer and integrate knowledge from his own field of study into education. He is able to select and apply the right techniques and strategies of study group management, higher education and evaluation of learning outcomes. He is capable of designing and implementing part of the educational process in accordance with current trends in higher education and the requirements placed on the level of communication and digital competencies.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PPC2/22	Course name: Teaching activities 2h/s
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Direct teaching activity 2 semester hours	
Learning outcomes: Through pedagogical activity, the PhD student demonstrates the ability to transfer and integrate knowledge from his own field of study into education. He is able to select and apply the right techniques and strategies of study group management, higher education and evaluation of learning outcomes. He is capable of designing and implementing part of the educational process in accordance with current trends in higher education and the requirements placed on the level of communication and digital competencies.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PPC3/22	Course name: Teaching activities 3h/s
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 6	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Direct teaching activity 3 semester hours	
Learning outcomes: Through pedagogical activity, the PhD student demonstrates the ability to transfer and integrate knowledge from his own field of study into education. He is able to select and apply the right techniques and strategies of study group management, higher education and evaluation of learning outcomes. He is capable of designing and implementing part of the educational process in accordance with current trends in higher education and the requirements placed on the level of communication and digital competencies.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PPC4/22	Course name: Teaching activities 4h/s
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 8	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Direct teaching activity 4 semester hours	
Learning outcomes: Through pedagogical activity, the PhD student demonstrates the ability to transfer and integrate knowledge from his own field of study into education. He is able to select and apply the right techniques and strategies of study group management, higher education and evaluation of learning outcomes. He is capable of designing and implementing part of the educational process in accordance with current trends in higher education and the requirements placed on the level of communication and digital competencies.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ KZP/22	Course name: Thesis consultant
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Final thesis consultant.	
Learning outcomes: By consulting the final thesis, the PhD student demonstrates broad and scientifically based knowledge in the field of study, as well as knowledge of a wide range of methods and approaches. Demonstrates the ability to critically assess a professional problem and its proposed solution, as well as to evaluate it and possibly propose another solution. He applies knowledge and skills from the field of pedagogical sciences to his own field.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PSU/04	Course name: Tools for Data Analysis and Processing
Course type, scope and the method: Course type: Lecture Recommended course-load (hours): Per week: 2 Per study period: 28 Course method: distance, present	
Number of ECTS credits: 4	
Recommended semester/trimester of the course: 2.	
Course level: III.	
Prerequisites:	
Conditions for course completion: Student will make a root macro for data analysis related to the student's research area. The results will be presented at a final seminar. Credit distribution: lectures + consulting: 37 hours - 2 credits study + preparation for the final seminar: 37 hours - 2 credits	
Learning outcomes: Extending the knowledge of the modern statistical data processing, archivation and visualisation of experimental and theoretical data, basic knowledge of the work with object oriented applications for analysis and data visualisation - ROOT and GRID.	
Brief outline of the course: I. block (1.-9. week): Selected topics from methods of experimental data analysis in physics, particle physics and from programming of basic physical applications in GRID and ROOT environment. II. block (10-12. week): Data analysis in particle physics, data fitting, error propagation, statistical and systematic uncertainties.	
Recommended literature: An Object Oriented Data Analysis Framework, http://root.cern.ch . GridCafe, http://gridcafe.web.cern.ch/gridcafe/ Wikipedia article on the World Community Grid: Contains additional links for each project being conducted on the World Community Grid. A Gentle Introduction to Grid Computing and Technologies (pdf). Retrieved on 2005-05-06, http://www.buyya.com/papers/GridIntro-CSI2005.pdf	
Course language:	
Notes:	

Course assessment	
Total number of assessed students: 11	
N	P
0.0	100.0
Provides: doc. RNDr. Marek Bombara, PhD.	
Date of last modification: 21.11.2021	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ POVK/22	Course name: Work in Organizing Committee of Conference
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 3	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Work in the organizing committee of the conference	
Learning outcomes: By working in the organizing committee of the conference, the PhD student demonstrates the abilities and competences to organize a scientific or professional event independently or in a team, to manage the implementation in terms of time and content, to communicate effectively verbally and in writing using various technical means as needed, including in a foreign language at a professional level with various types of people, if necessary, correctly recommend solutions or make independent decisions.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 0	
abs	n
0.0	0.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	

COURSE INFORMATION LETTER

University: P. J. Šafárik University in Košice	
Faculty: Faculty of Science	
Course ID: ÚFV/ PDS/22	Course name: Writing Dissertation Work
Course type, scope and the method: Course type: Recommended course-load (hours): Per week: Per study period: Course method: distance, present	
Number of ECTS credits: 20	
Recommended semester/trimester of the course:	
Course level: III.	
Prerequisites:	
Conditions for course completion: Obtaining the required number of credits in the prescribed composition according to the UPJŠ study regulations, preparation and defense of the thesis, successfully completed dissertation examination	
Learning outcomes: The PhD student demonstrated the prerequisites for successful continuation of the study by fulfilling the conditions prescribed by the study regulations for the study and scientific part of the doctoral study related to the topic of the dissertation.	
Brief outline of the course:	
Recommended literature:	
Course language:	
Notes:	
Course assessment Total number of assessed students: 2	
N	P
50.0	50.0
Provides:	
Date of last modification: 08.11.2022	
Approved: prof. RNDr. Milan Žukovič, PhD.	